

Climate Change Adaptation Strategy

2019 - 2024



Acknowledgements

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- Wexford County Council Climate Change Adaptation Group

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Foreword



Climate Change is the defining issue of our time and we are at a defining moment. Climate change is happening now. Ireland is at the beginning of a long and challenging process of transitioning to a low-carbon, climate resilient and environmentally sustainable economy.

The people of Wexford have experienced first-hand the extreme weather events from the impacts of climate change particularly through storms and river and coastal flooding.

Local Authorities are at the forefront in dealing with and reacting to the consequences of Climate Change. Wexford County Council is committed to adapting to and building a resilient county going forward prepared for these impacts. This means putting in place measures to adapt to Climate change which will enable the council to continue to deliver services and functions across the county in an effective manner.

The Climate Change Adaptation Strategy is the first step in building the foundations required to enhance resilience to climate hazards. The actions presented in this plan will guide County Wexford as we prepare for, respond to, and adapt to the impacts of climate change and mitigate against the causes through a reduction in greenhouse gas emissions.

Michael Sheehan
Cathaoirleach



Climate change is one of the most critical challenges facing the world today. The impacts of Climate change are already visible and are expected to intensify over the coming decades. It is important to acknowledge that whilst we continue in our attempts both at local level and international level to mitigate against climate change, we must also now adapt to the impacts of climate change.

This Climate Change Adaptation strategy provides a fundamental tool for Wexford County Council to address the challenges and develop innovative and sustainable solutions that address adaptation and enhanced resilience to a changing climate.

The Strategy for County Wexford has 82 actions. A significant number of the adaptation actions are already advancing. The Council is well placed and mobilised to focus and drive local adaptation having influence in areas such as housing, transport, land use planning, protection of natural and cultural environments, community development as well as sustainable economic development. Wexford County Council is committed to being a frontrunner in effecting change in terms of mitigation and adaptation. This is demonstrated in the lead role Wexford County Council has taken in transitioning to low carbon, energy efficient passive and near Zero Energy Build housing projects for both new builds and the retrofitting of our existing social housing stock.

I wish to express appreciation to everyone who has contributed to the preparation of this strategy

Tom Enright
Chief Executive

Executive Summary

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

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

Understanding how well adapted as an authority we are to current weather extremes and climatic trends was a crucial step in developing this adaptation strategy. The focus was on identifying the complete range of hazard events to have affected Wexford. Following this it was considered that understanding how the impacts of climate hazards are likely to evolve in the future was a crucial element of adaptation strategy development. Therefore, a Climate Risk Register was created which summarises information gained through the baseline assessment and identifies future impact and vulnerability assessment through a series of climate risk statements, associated time frames and projections of future changes in these risks.

Having identified and prioritised the risks posed by climate change recurring thematic areas were identified in order to target adaptation goals and objectives. Following the selection of thematic areas, adaptation goals and objectives were identified to support Wexford County Council in achieving climate resilience.

Perhaps the most important element of the adaption plan is the adaptation actions identified in order to enhance the capacity of Wexford County Council to adapt to climate change impacts and to address priority climate risks in the context of projected climate change.

Ultimately the success of this plan will depend on the implementation, monitoring and evaluation of those actions selected. It is expected that the actions within this plan will be reviewed and refined as monitoring and evaluation establish what is appropriate. Ultimately it is hoped that this plan demonstrates that Wexford County Council are planning proactively to take action and will make the required adjustments to minimise or avoid the existing and anticipated impacts from climate change.

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Chapter 1 Climate Change, Policy and Adaptation

1.1 Introduction

When we talk about climate change, we talk about changes in long-term averages of daily weather. The difference between weather and climate is a measure of time. Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time.

We know the climate is changing because, averaged out over longer periods, the global mean temperature has been consistently rising, across land and sea. It is now about 1.0°C above pre-industrial times.

The clearest trend is evident in the temperature records which show a mean temperature increase of nearly 1.0° C between 1890 and 2018, i.e. an increase of 0.06° C per decade. The increase was 0.4° C during the period 1980-2008, i.e. equivalent to 0.14° C per decade.

The below graph Fig 1.1 shows global temperatures from 1860 to 2018.

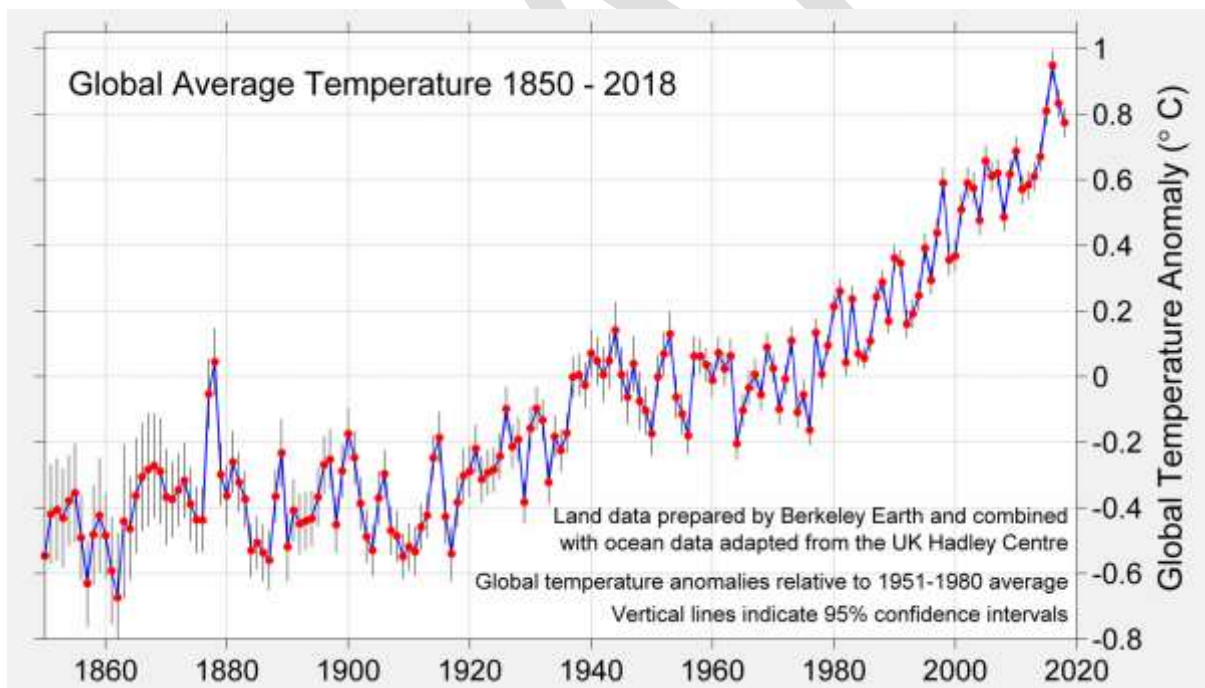


Fig 1.1 Global Temperatures

Other Indicators

- Six of the ten warmest years in Ireland have occurred since 1990
- A reduction in the number of frost days and shortening of frost season length
- An increase in annual rainfall in northern and western areas with decreases or small increases in the south and east.

These changes are reflected in Ireland's natural environment with an increase in the growing season and with greater number of animals suited to warmer temperatures being evident in Ireland and its surrounding waters.

1.2 What causes Climate Change/Global Warming

Certain gases in the Earth's atmosphere (water vapour, CO₂, methane and others) allow sunlight to pass through, but then stop the heat from escaping back out into space - much like glass in a greenhouse. These gases exist naturally in our atmosphere, and without them, our planet would be uninhabitable to most forms of life. However, humans have increased these gases, particularly CO₂ and to a less extent CH₄, giving rise to a change in our climate.

The most significant increases are in carbon dioxide (there is now over a third more CO₂ in our atmosphere than there was before the industrial revolution) and methane. Methane is a more potent greenhouse gas, but it only remains in the atmosphere for about a decade. Carbon dioxide lasts for about 100 years or more, so even if we stopped emissions from human activities altogether, the planet would continue to warm up from the gases already emitted. The main causes of increased CO₂ in the atmosphere are burning fossil fuels (coal, oil and gas), and deforestation and other changes in land use that release stored CO₂ and methane. Humans are currently emitting around 30 billion tonnes of CO₂ into the atmosphere every year.

The graph fig 1.2 below shows CO₂ levels today and how this compares with the last 10,000 years.

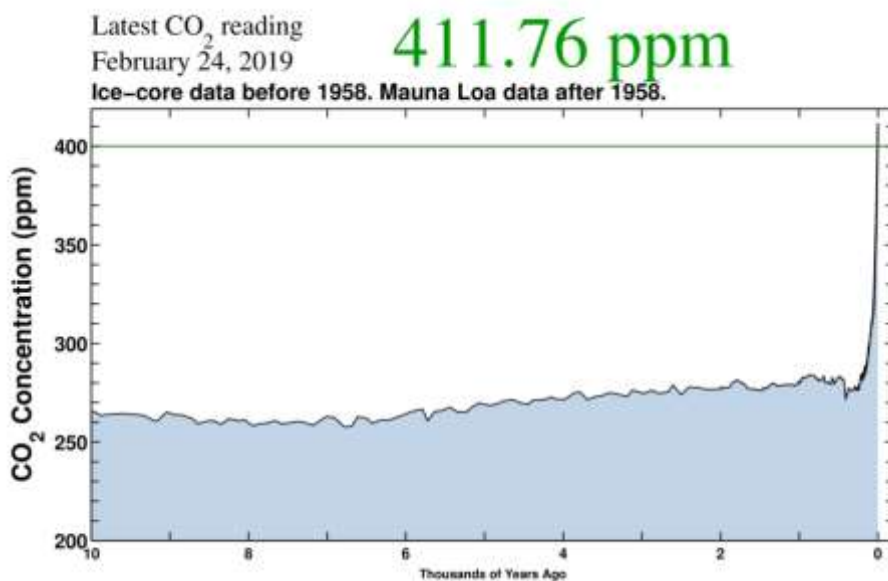


Fig 1.2 CO₂ Readings

Scientific evidence for warming of the climate system is unequivocal. According to the Intergovernmental Panel on Climate Change (IPCC)¹ warming of the climate system is attributable to human activities as a consequence of greenhouse gas emissions² from:

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

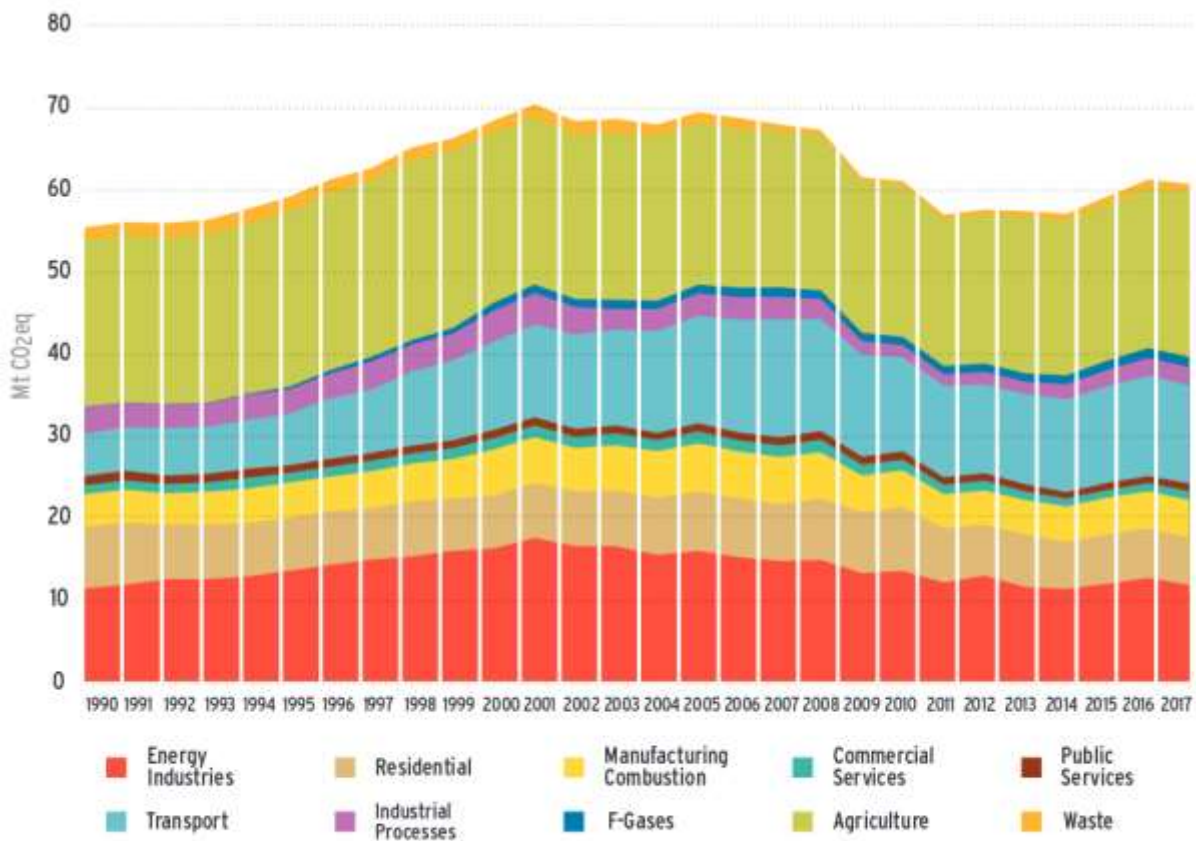
Emissions from these activities are proven to impact the atmosphere by trapping the sun's radiation and reflecting back to the earth giving rise to global warming. The term greenhouse effect has been coined to describe this occurrence.

If we carry on emitting greenhouse gases at the rate we are today our climate will become more and more unstable. Extreme weather events will become more common, ecosystems will be put under stress and so will human agriculture and water supplies. Some parts of the world are particularly vulnerable, such as coastal regions and arid deserts, but no area will be immune, and with global temperatures projected to rise further this will bring changes in weather patterns, rising sea levels and increased frequency and intensity of extreme weather.

Agriculture is the single largest contributor to the overall emissions, at 29.2% of the total, followed by Energy (power generation & oil refining) at 21% and Transport at 21%. The remainder is made up by Industry and Commercial at 14.8%, the Residential sector at 12%, and Waste at 2%.

¹ The IPCC was created in 1988. One of its key objectives is to provide governments at all levels with scientific information that they can use to develop climate policies. IPCC reports are a key input into international climate change negotiations.

² Greenhouse Gases include: water vapour, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and industrial gasses: Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF₆), and Nitrogen Trifluoride (NF₃). Carbon Dioxide emissions in the atmosphere are the main greenhouse gas caused by human activity



Ireland's greenhouse gas emissions peaked in 2001 and have decreased by 13.8%* over the 16 year period to 2017

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 impacts are projected to increase in the coming decades and during the rest of this century. Uncertainties remain in relation to the scale and extent of these impacts, particularly during the second half of the century. The greatest uncertainty lies in how effective global actions will be in reducing greenhouse gas emissions. Predicted adverse impacts include:

- sea level rise,
- more intense storms and rainfall events,
- increased likelihood and magnitude of river and coastal flooding and
- water shortages in summer in the east
- adverse impacts on water quality

- changes in distribution of plant and animal species
- effects on fisheries sensitive to changes in temperature

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

1.3 The challenge for Ireland

There is evidence that Irelands climate is changing in line with the global trends of climate change. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and we have been impacted by frequent, intense and more extreme weather events. Temperatures have increased by 0.8⁰C since 1900 and sea level rises of about 3.5cm per decade have been observed since 1990. Climate Change has diverse and wide ranging impacts on Ireland's economic and natural resources including:

- More intense storms and rainfall events giving rise to disruption to society
- Increased river and coastal flooding
- Water shortages in summer
- Increased risk of new pests and diseases
- Adverse impacts on water quality
- Changes in the distribution and phenology of plant and animal species on land and in the oceans³

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

- Increase in average temperatures across all seasons. Heat waves are expected to occur more frequently.
- Significant reductions are expected in average levels of Spring and Summer rainfall with a substantial increase in the frequency of heavy precipitation events in Winter and Autumn
- Decrease in overall 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.

³ EPA Research, A summary of the state of knowledge on Climate Change Impacts for Ireland, Report No. 223, 2017

All local authorities including Wexford County Council provide a wide range of services, many of which are already and will increasingly be affected by climate change. In the future Wexford County Council will play an increasing critical role in responding to the impacts of extreme weather events and other impacts that are likely to emerge over the coming decades. This will be through various implementation tools available as a local authority⁴.

1.4 What can we do

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

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

1.5 What is Climate Adaptation?

Climate Adaptation can be best described as planning proactively to take action and make adjustments to minimise or avoid the existing and anticipated impacts from climate change. The Intergovernmental Panel on Climate Change (IPCC), in 2014, defined climate adaptation as: “The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.”

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

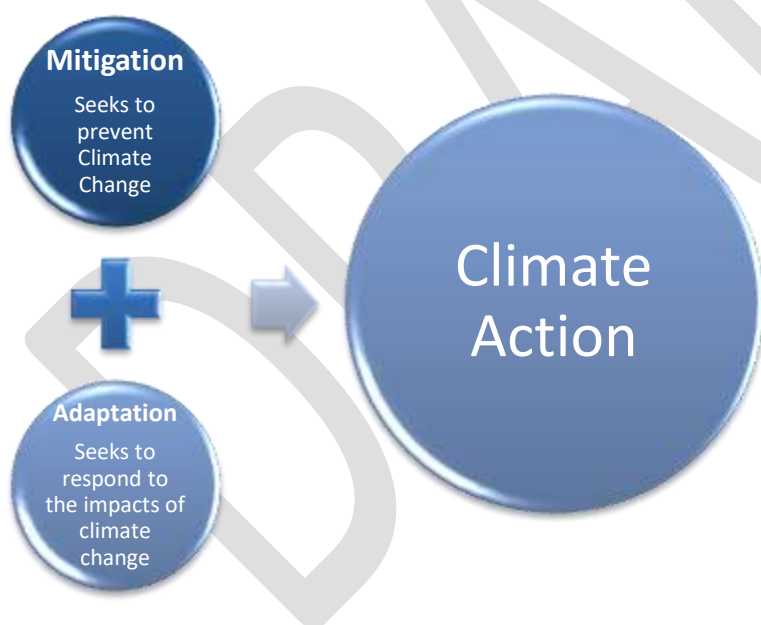
⁴ Including: Spatial Planning, development consent, asset management and natural resource protection.

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

1.6 Adaptation and Mitigation

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.



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, facing head on the challenges of a changing climate. Crucially, it also helps in building resilience within the local authority organisation itself as well as across all communities. While there is strong emphasis on local authorities through the NAF to develop and implement adaptation measures and actions, mitigation measures and actions that seek to combat, reduce or eliminate the emissions of greenhouse gases are also hugely important. Local authorities have a significant role to play in actively implementing mitigation actions through measures including the design and construction of flood defences, retrofitting of building stock, energy efficient projects, promoting sustainable energy communities and encouraging sustainable transport and 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 6 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 Wexford.

1.7 Adaptation Policy Context

This local authority adaptation strategy is set within a policy framework at International, European and National level as per the details outlined 1.7.1 to 1.7.3.

1.7.1 International Context

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. The framework's objective is "to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The framework set non-binding limits on greenhouse gas emissions and contained no enforcement mechanisms. However, the framework outlined how specific international treaties may negotiate further action towards its key objective. **The Paris Agreement 2015** is a protocol set within the context of the UNFCCC (ratified by Ireland on 4th November 2016) and it is aimed at:

- limiting global warming to less than 2⁰C above pre-industrial level and pursue efforts to limit the temperature increase to 1.5⁰C
- Increasing the ability to adapt to the impact of climate change and foster climate resilience

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

1.7.2 EU Context

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

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

Sustainable Development Goals

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

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

1.7.3 National Context

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

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

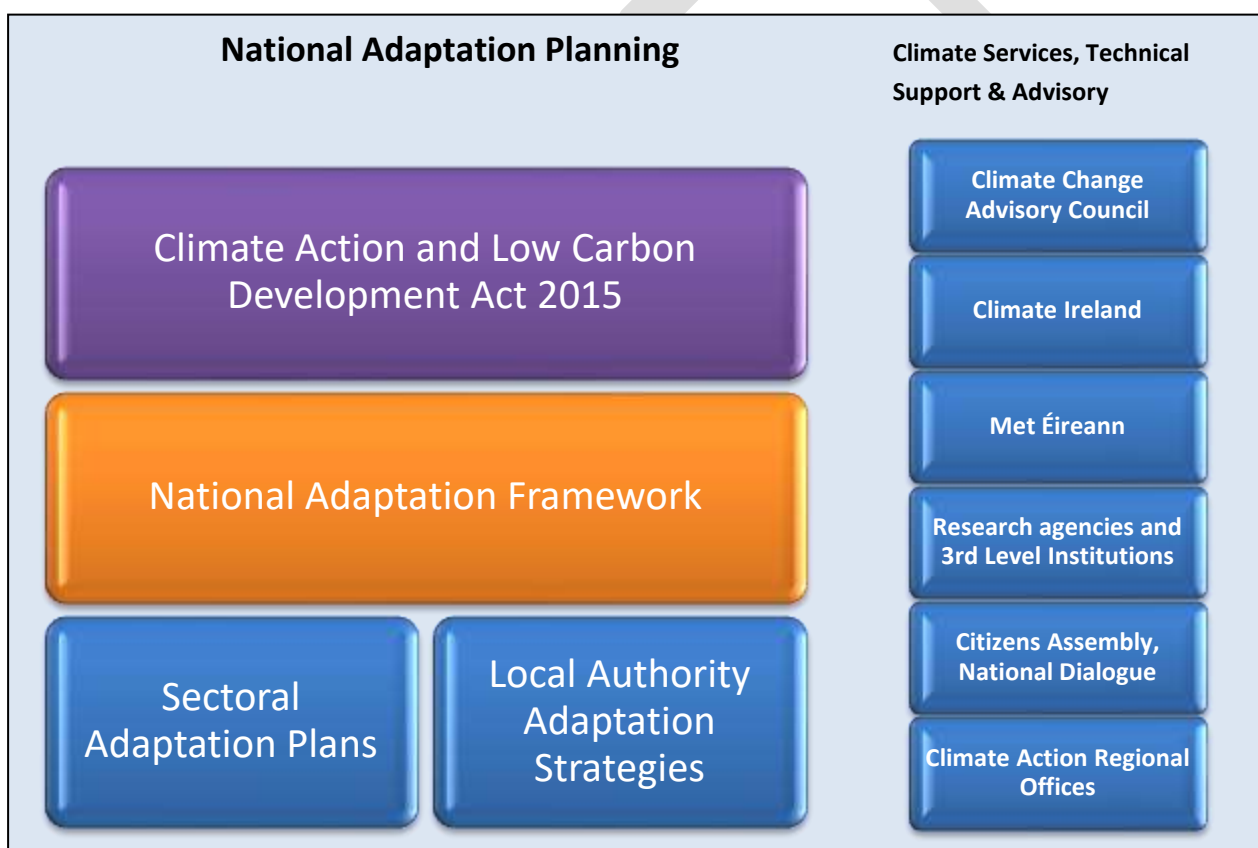
The Climate Action and Low Carbon Development Act 2015 was a landmark national milestone in the evolution of climate change policy in Ireland. It provides the statutory basis for the national transition objective laid out in the National Policy Position (as per above). Further to this, it made

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 Wexford County Council has been consistent with these guidelines.

Relationship with other key climate related plans/strategies

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



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

opportunities will be advanced to align with and collaborate with adjoining local authorities including Wicklow, Carlow, Kilkenny and Waterford.

1.8 Purpose of this strategy:

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

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

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

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

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

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

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 Wexford County Council before the 30th September 2019.

1.9 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 effect⁵. Ocean Acidification

In more recent years, another significant issue has emerged. Ocean Acidification will have harmful effects on marine organisms and has the potential to disrupt global marine ecosystems.

1.10 Methodology

To develop this climate adaptation strategy a climate adaptation team was convened, representing all functions of Wexford County Council. A workshop was held on 18th December 2018 facilitated by Caro to assess Wexford County Council's adaptation baseline and identify vulnerabilities and risks to projected climatic events. Following on from the workshop further meetings were held with individual departments. In developing this strategy, Wexford County Council policies and plans – such as the Wexford County Development Plan 2013 - 2019, were reviewed and climate change information resources, such as ClimateIreland.ie and Met.ie were used to inform the development process.

The draft adaptation strategy will be made available for public consultation and open for commentary. The final draft will be adopted by Wexford County Council before the 30th September 2019, prior to its formal publication.

Consultation with prescribed environmental authorities for the purposes of Strategic Environmental Assessment will be undertaken in accordance with the provisions of the European Communities (Environmental Assessment of Certain Plans and Programmes Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011)).

1.11 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 a Strategic Environmental Assessment (SEA) is required.

“Screening” is the process for making a determination as to whether a particular plan, would be likely to have significant environmental effects, and would thus warrant SEA. This strategy has been screened for SEA and it is determined that full SEA is not required. The screening report accompanies this strategy.

⁵ El Nino is a climate cycle in the Pacific Ocean with a global impact on weather patterns.

Screening overview for 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. It is determined that stage 2 Natura Impact Report is not required. The screening report accompanies this strategy.

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Chapter 2 Regional and Local Context

2.1 Eastern & Midlands Climate Action Region and County Wexford in context

Wexford County Council is located within the Eastern and Midlands Climate Action Region (CARO) and is one of 17 Local Authorities in the region. Wexford County Council is located to south east. It is a maritime county, bounded by the sea on the south and east, Carlow, and Kilkenny to the west and Wicklow to the North. The Eastern and Midland CARO has assisted and supported Wexford County Council in the development of this climate change adaptation strategy.



Background to the Eastern and Midland Climate Regional Office

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

The four CAROs have been established to drive climate action at both regional and local levels. In recognition of the significant obligation to develop and implement climate action measures, the four regional offices are mandated to co-ordinate engagement across the varying levels of

government and help build on experience and expertise that exists in the area of climate change and climate action.

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

The four CARO regions and constituent local authorities are illustrated in the map in table 2.1 as follows:

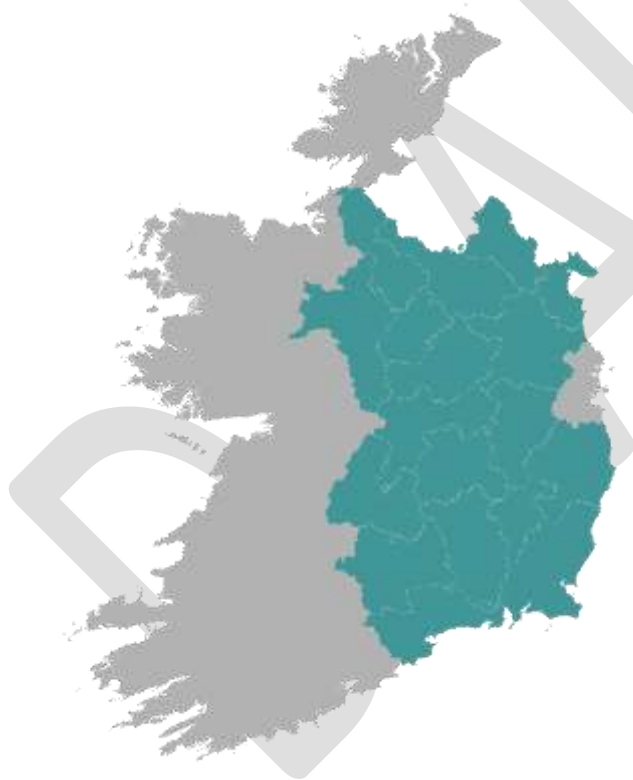
Table 2.1



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

Profile of Eastern and Midland Climate Action Region

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



The region with its extensive pattern of settlement areas and rural areas and has a population of almost 1.8 million people accounting for 37.7% of the total population of the state⁶ and at 32,542 sq.km occupies 46.3% of the area of the state⁷. The region plays a significant role economically to the country hosting a range of sectors inclusive of multinationals, public service, private and small-

⁶ Total population of E&M Region is 1,796, 923 persons. The state population is 4,761,865 persons (CSO, 2016).

⁷ Total area of state is 70,282 sq.km

medium enterprises. Agriculture remains the prevailing sectoral land use in the region.

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

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

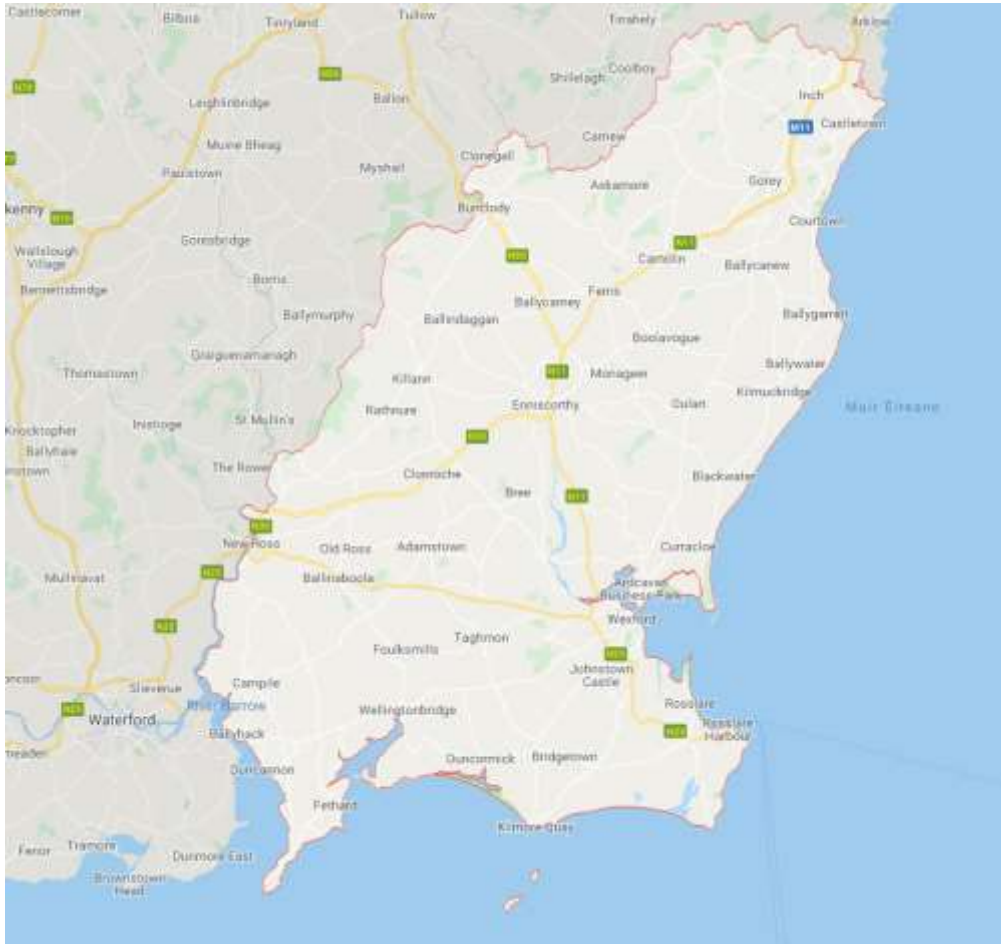
The region offers an extensive and crucially important network of critical infrastructure. The road network in the region typically radiates from the metropolitan Dublin Region. The Rail Network is significant with the Dublin-Cork, Dublin-Limerick, Dublin-Waterford, Dublin-Rosslare and Dublin-Galway/Mayo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

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

2.2 Wexford County in Context

Wexford is located in the south-east corner of Ireland. It is a maritime county, bounded by the sea on two sides—on the south by the Atlantic Ocean and on the east by St. George's Channel and the Irish Sea, with a coastline that extends to approximately 246 km. The county has a land area of approximately 236,527 ha, composed of gently rolling countryside from the Hook Peninsula on the south-west coast, the slob lands in the east, the Slaney and Barrow river valleys to the foothills of the Blackstairs Mountains in north-west of the county.

It has four main towns. Wexford and New Ross are located in the south and west of the county, while the towns of Enniscorthy and Gorey support the northern part of the county.



Population and Settlement Trends

The population of County Wexford stood at 149,722 in April 2016, an increase of 3.0 per cent over the five years from 2011, which indicated a population of 145,320 persons. In the period 2006 to 2011, the County experienced the highest rates of natural increase and net migration in the South-East Region. Over half of the net migration to the South-East Region was concentrated in County Wexford and 48.3% of the increase in population in County Wexford (6,544 persons) is due to net inward migration.

A national study of 2004⁸ estimated that the county Wexford has the highest proportion of vulnerable coast, with 40% of it in need of protection.

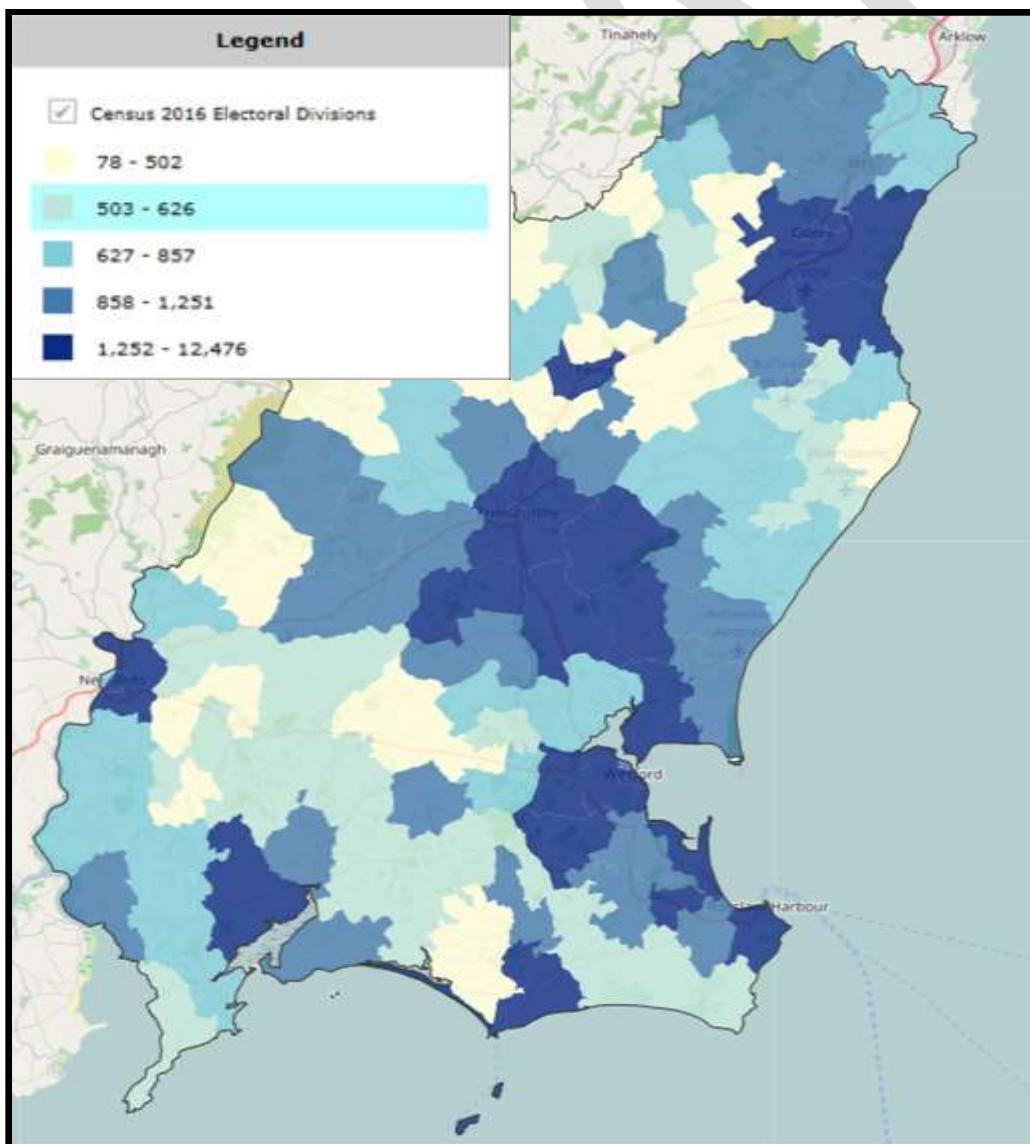
The number of households in Wexford is 54,289 compared to 1,702,289 nationally and the most common type of dwelling in Wexford is detached. This is also the most common house type nationally, although the number of detached dwellings in Wexford stands at 61.4 per cent compared to 42.1 per cent in the country overall, an indication of the relatively high occurrence of one-off housing in the county.

⁸The Department of Communications, Marine and Natural Resources, 2004, *Value for money review of the coast protection programme*.

Demographics and settlements

Over a 20 year period (1996-2016), Wexford experienced a 43.4% (43,351) increase in its population base – the fifth highest rate in the state. According to the 2016 Census, the population aged 0 to 24 Years residing in Wexford was 49,898 and represents 33.3% of the total population. At Municipal District level a considerable variation is evident. More than half (55.7%) of the total population increase recorded in county Wexford (+4,402) was recorded in the Gorey MD with an increase of 2,454 (7.2%) followed by Enniscorthy MD (3.5% or 1,210) and Wexford MD (835 or 1.9%). The New Ross MD recorded a decline in population of -97 or 0.3%. The '65 and over' age cohort now represents 14.7% of the total population living in the county. Since 2011 this cohort has increased by 19.7%

Approximately 43% of the county's population live on 3.3% of the county's total land area. Highest densities are found in the large settlements and surrounding hinterland areas with the south-east part of the county having the highest densities.



County Wexford
Population 2016 by ED

Source: AIRO All Ireland
Research Observatory

Infrastructural Assets

The road Network in County Wexford consists of over 3400km of road network comprising 25km of Motorway and 171km of national roads. The remaining network consists of both regional and local roads. The 2019 budget for non-national roads is €21.4m which is a reduction of €3.54m compared to 2008.

There are two current major road projects underway in County Wexford.

M11 Gorey to Enniscorthy PPP Scheme

This scheme comprises of a new motorway from the end of the Gorey Bypass at Clogh to the townland of scurloughbush north of Oylegate village. This is a 27km extension to the M11. It will also contain a spur to the New Ross Enniscorthy N30 road and a link to the N80 Bunclody road. The scheme is currently under construction with considerable progress being made and the completion date is 3rd quarter 2019.

N25 New Ross Bypass PPP Scheme

The N25 New Ross bypass PPP project comprises a 14km dual carriageway road including new sections of both the N25 and N30 National Primary routes. The bypass commences at a roundabout junction with the existing N25 at Glenmore, County Kilkenny before crossing over the River Barrow on a 3 towers extrados bridge extending for approximately 900 metres from Pink Rock in County Kilkenny to Stokestown in County Wexford and continuing until it ties in with the N30 at Corcorans Cross. It will encompass a major high rise bridge over the River Barrow which is set to become a tourist attraction in itself.

The completion date for this scheme the 4th quarter of 2019.

Ports

There are two principal ports in the county: Rosslare Europort and New Ross Port. Rosslare Europort is a strategic national, regional and county asset. The role of the port is both a commercial and passenger Port. It handles the largest volume of pedestrian traffic in Ireland and is the biggest roll-on-roll-off passenger and freight service operating in the Irish Sea. There is significant development potential in the logistics sector given its strategic location.

Rosslare Port facilities have been approved as a border inspection post for animal origin product

imports. Crucially, these facilities will give Rosslare Europort a significant advantage as it becomes only the second sea port designated as a border control post.

New Ross Port is also of strategic importance, particularly with regard to handling specialist cargo in dry and liquid bulk products.

Other harbours in the county have important functions serving local commercial business particularly fishing at Kilmore Quay and recreational and tourism functions.

Bus

Bus Services in the county are run by semi-state and private companies such as Wexford Bus. There are also active community transport organisations such as local link and the Rural Bus providing services in the county as agents for the Government's Rural transport programme. Local Link Wexford is one of 17 nationwide offices that manage rural transport under a social inclusion initiative funded by the National Transport Authority. Local Link manages a total of circa 55 Rural transport services and 4 public transport services over the county of Wexford. The purpose is to give people in rural locations the means to get to their nearest town for shopping, appointments, social etc.

Train

The Rosslare Harbour Dublin railway line is now the only operating rail service in the county and is designated as a Strategic Radial Corridor in the National Spatial Strategy 2002-2022 (NSS). A 2016 Rail Review Report published by the National Transport Authority and Iarnród Éireann, identifies that cost savings would be made by suspending services on a number of rail lines in the country - including the Dublin to Rosslare Europort line south of Gorey. Check re the report submitted by WCC in response to rail review report.

Cycling and Walking

The promotion of safe walking and cycling networks is encouraged to create active, healthier and sustainable communities and assist in reducing volumes of traffic and reduce greenhouse gas emissions. There are a number of proposed cycling Greenway routes under consideration and design stage at present. These include

- Rosslare to Waterford City Greenway.
- New Ross to Waterford Greenway:
- Curracloe to Wexford Greenway:

Wexford County Council is working in co-operation with Wexford Walking Trails Group and have developed 23 accredited trails in the county with continuous addition of trails particularly along the coastline (rehabilitation of Sli Carman route)

Water and Wastewater Infrastructure

The provision of high quality water supply and wastewater infrastructure is fundamental to ensure the long-term physical, environmental, social and economic development of County Wexford. The population growth, which occurred in recent years placed significant pressures on water and wastewater facilities in many of the county's settlements.

Since January 2014, Irish Water is the State body responsible for the delivery, integration and implementation of strategic water and wastewater projects and infrastructural improvements. Wexford County Council has a Service Level Agreement (SLA) with Irish Water in relation to the provision of water and waste water services.

Wexford County Council operates 212 facilities and 2,050 km of public water mains serving approximately 105,000 people (75% of population) on behalf of Irish Water through the SLA. The volume of drinking water production in 2016 was 14,132,777m³. Drinking Water standards are set down by EU regulation and are supervised by the EPA.

Wexford County Council operates 189 wastewater facilities and 647 km of public sewer throughout the county treating the waste from both domestic and trade/industrial sources on behalf of Irish Water through the SLA. All Irish Water sites are licensed and monitored by the EPA. Approximately 55% of the population is serviced by public wastewater facilities with the remainder serviced by privately operated or individual treatment plants.

Employment Location/Sources

According to Census 2016, the total Labour Force residing in Wexford is 69,237 and is equivalent to 59.3% (Labour Force Participation Rate) of the total population 15+ (116,770) residing in Wexford. This rate is lower than the State (61.4%), Southern Regional Authority (RA) (59.5%) and South- East Strategic Planning Area (SPA) (59.7%) averages.

According to Census 2016, the total labour force 'At Work' residing in Wexford is 57,759 and equates to 83.4% of the total labour force within the county. This rate is lower than the State (87.1%), Southern RA (87%) and South-East SPA (84.6%) averages.

In a similar fashion to the State profile, the most dominant industries of Wexford workers is within the 'Commerce and Trade' (22.7%) and 'Professional Services' (22.2%) - both accounting for nearly half of all Wexford resident workers. Industrial sectors such as; 'Agriculture Forestry Fishing' (7.5%), 'Building and Construction' (6.9%) and 'Manufacturing Industries' (12%) are all higher than the equivalent State averages. Since Census 2011, the 'Building and Construction' industry has witnessed the largest increase (+23.8% or 769) and now accounts for 6.9% of all resident workers.

According to the CSO Place of Work Census of Anonymised Records (POWSCAR) 2016, there was a total of 56,820 people at work residing within Wexford. Of these, 65.8% (37,372) were employed within the county, 19.4% (11,001) had no fixed place of work (either Blank destination or Mobile workers) and the final 14.9% (8,447) commute to employment destinations outside of the county boundary. Excluding those without a fixed place of work, Wexford has an 'Outbound' commuting rate of 18.4%. Key employment destinations are Wicklow, Waterford City and County and Dublin City.

Commuter flows to the Dublin Metropolitan Area (as identified in the NTA Transport Strategy for the Greater Dublin Area) are an important part of the Wexford economic baseline and large parts of the county are under the influence of the extensive employment opportunities available in the metropolitan area. In total, 2,745 Wexford resident workers are employed within the metropolitan area and accounts for 4.8% of all resident workers or approximately 6% of all workers with a fixed job location. Highest rates are primarily within the Gorey MD and in areas north of Enniscorthy with many areas having in excess of 30% of its workers travelling to work destinations outside the county.

According to the results from POWSCAR 2016, there are a total of 37,372 resident Wexford workers who are employed within the county. In addition to this there are also a total of 3,156 inbound commuters who travel from outside the county to jobs located within Wexford. As such, the total number of jobs located within Wexford is 40,528. The largest origin local authorities are as follows: Kilkenny, Wicklow, Carlow, DLR, Tipperary and Kildare.

Economic Development

Wexford County Councils Economic Development unit plays a key role by providing a range of supports to Irish and International businesses and ensuring Wexford remains a competitive and attractive location for companies to set a base in. International Financial Services, Life Sciences, Information Communication technology (ICT) and internationally traded services all feature

strongly in Wexford Business portfolio. Currently there are 22 multinational companies in Wexford which employ close to 3000 people.

The Council is currently planning a number of projects in the county's main towns to ensure appropriate and affordable office space is provided and available.

Wexford Town

The proposed "Trinity Wharf" site will host a state-of-the-art marina along with high-end public realm space commercial office and hotel developments. Grant aid of €2.028m has been secured for the scheme under the Urban Regeneration Development Fund (URDF) to date. The planning application for the Trinity Wharf development is currently under consideration by An Bord Pleanála.

The Min Ryan public park is currently under construction. The park is expected to open to the public in September 2019.

Improvement works commenced on crescent Quay Wexford early 2019 and due for completion in July.

Carrigfoyle Activity Centre is located just outside Wexford town in a disused quarried site. Construction of infrastructural works such as access road, car parking and activity trails is planned to commence in 2019 and it is envisaged that works will be completed by 2020.

Gorey Town

The construction of a 30,000 sq. ft. commercial office (Hatch Lab) development less than 50 minutes from the M50 motorway was completed in 2018. The new unit (one of three due to be completed) will deliver state of the art modern office accommodation. The M11 Business Campus in Gorey represents a key-piece of infrastructure for the future development of north Wexford. It will be home to "Innovate" a successful Gorey company who provide I.T Consultancy Services. Shared Spaces/Hot desks will also be available for startup companies.

Gorey Market House: Funding has been allocated to advance the project through detailed design and tendering.

Enniscorthy

Site works are underway in April 2019 on the Enniscorthy Technology Park, Killagoley. The technology park will provide a European Centre of Excellence to provide education in High Performance Buildings to students from all over the world and help develop standards that will

improve energy efficiency in buildings and dramatically reduce emissions. The centre in Enniscorthy will join with other centres in New York and Vancouver and the deal was signed beneath the backdrop of US, Canadian, Irish and United Nations flags.



Funding has been secured from the Outdoor Recreational Infrastructure Scheme for walking trails connecting the town with Vinegar Hill which will use the technology park site.

Consulting Engineers have been appointed for the preliminary designs, environmental studies and planning documents for the Templeshannon Regeneration, Enniscorthy

New Ross

Initial funding was received for the John Street Building Regeneration Project towards the acquisition and redevelopment of the old grain stores at John Street, New Ross. It is planned to convert these buildings into a high quality enterprise hub. Architects have been appointed for design, planning and construction management services. The Part VIII process is due to commence in Q2 2019, with construction completion planned for Q4 2020.

The High Hill site is a strategic urban site connecting John Street and the town centre to the 12th century St Mary's Church and Cemetery. A preliminary design, drawings and reports to support an application for development consent are currently being prepared. The Part VIII process is expected to commence in early Q2 2019.

Natural Environment

Wexford is located in the Irish River Basin District. The single river Basin District covers an area of 70,273km² with 46 catchment management units consisting of 583 sub-catchments and 4,829 waterbodies. The two major rivers in Co. Wexford are the Slaney and the Barrow. The Barrow is the second longest river in Ireland at 192 kilometres and is one of the three sister rivers that rise in Co. Tipperary. The Slaney River rises at Lugnacoille Mountain in Co. Wicklow and flows through the towns of Stratford-on-Slaney, Baltinglass, Tullow, Bunclody, Enniscorthy and Wexford for approximately 117km before reaching the sea at Wexford Harbour.

The main rivers in County Wexford are contained in the table below

Main Rivers in County Wexford

Slaney	Barrow
Owenduff	Pollmounty
Corrock	Urrin
Boro	Sow
Bann	Owenvorragh

Table 2.1 Main Rivers in County Wexford

The coastline of Wexford stretches from Kilmichael point in the north of the county to Waterford Harbour located in the south and is approximately 246km long with 211km of soft coast with 100km considered at risk. There are many established uses along the coastline including ports, harbours, fishing, aquaculture, residential, leisure and amenity. The coastline is an important resource to protect and is one which is also subject to erosion from sea level rises due inter alia to climate change.

Co. Wexford is famous for the miles of unspoiled golden beaches that stretch along its coastline. Bathing water quality in Wexford is predominantly “Excellent” with blue flag beaches – Ballymoney, Courtown, Morriscastle, Ballinesker, Ballinesker, Curracloe, Rosslare, and Carne(2018), a blue flag marina at Kilmore Quay and a number of Green coast beaches.



County Wexford has a rich natural and built heritage of landscapes, flora, fauna, habitats, monuments, archaeology and heritage objects. Natural Heritage often described as biodiversity describes the variety of all living things and we depend on it to provide clean air, water and healthy environment. The Wexford Biodiversity plan sets out a series of actions to support biodiversity and the natural heritage in our County. Wexford has a significant number of sites designated for protection under national and European Legislation. These include Special Areas of Conservation (Habitats) Special Protected Areas (Birds) and Natural Heritage Areas. Together, Special Protection Areas (SPAs) and Special Areas of Conservation (SAC's) make up a network of European Sites known as the Natura Network. There is currently one SAC, fifteen candidate SAC's and nine SPAs in County Wexford.



Archaeological Heritage refers to sites, monuments and complexes imprinted in the landscape and area protected under the national monuments Act 1930 -2004. There are approximately 1700 monuments in County Wexford included on the Record of monuments and Places.

Architectural Heritage refers historic or modern buildings of architectural, technological or social importance. There are currently c. 800 structures on the Record of Protected structures.

Chapter 3 Adaptation Baseline Assessment

3.1 Introduction

Assessing the baseline provides for an understanding of how well adapted Wexford County Council is to current climate hazards which include extreme weather events and period of climate variability. This process is a crucially important first step in developing an adaptation strategy that is relevant and responds specifically to the impacts of climate change experienced locally. This assessment takes account of a range of climate hazards that have affected Wexford County Council in the past specifically in respect of local level vulnerability and the impacts and consequences for the delivery of services and functions across the county. While past and recent experiences of climate hazards may not entirely be representative of the longer term climate reality, it is a useful starting point in the assessment of impacts on local authority services which can further be examined in the context of the identification of future risk. Conducting this assessment will illustrate Wexford County Council's capacity to cope with existing extreme weather events and periods of climate variability and identify the resilience of key services.

3.2 Observed Climate Hazards

Warming of the climate is happening since the mid-20th century. Observations show that global average temperatures have increased by almost 1.0°C between 1890 and 2018. The atmosphere and oceans are warming and sea levels are rising while the amount of snow and ice is falling. The impacts can be seen on all continents.

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





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

- sea level rise
- more intense storms and rainfall events
- increased likelihood and magnitude of river and coastal flooding
- water shortages in summer
- increased risk of new pests and diseases
- adverse impacts on water quality and

- changes in distribution and phenology (the timing of lifecycle events) of plant and animal species on land and in the oceans⁹.

The following table, taken from the National Adaptation Framework highlights the main observations in Irelands changing climate:

Table 3.1: Observed changes in Irelands Climate

Parameter	Observed
 Temperature	<ul style="list-style-type: none"> ■ Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade. ■ The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.
 Precipitation	<ul style="list-style-type: none"> ■ Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30-year period 1961-1990. ■ The largest increases are observed over the west of the country.
 Wind Speed and Storms	<ul style="list-style-type: none"> ■ No long-term change in average wind speed or direction can be determined with confidence. ■ The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950.
 Sea Level and Sea Surface Temperature	<ul style="list-style-type: none"> ■ Historically, sea level has not been measured with the necessary accuracy to determine sea level changes around Ireland. However, measurements from Newlyn, in southwest England, show a sea level rise of 1.7cm per decade since 1916. These measurements are considered to be representative of the situation to the South of Ireland. ■ Sea surface temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish coastal records.

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

Table 3.1 Source: National Adaptation Framework 2018

3.3 Wexford Climate Hazards & Past Climate Events

The impacts of climate change experienced in County Wexford reflect in general the national pattern and trends of observed climate hazards. A review of extreme weather events in County Wexford over the past 35 years has been undertaken using published Met Éireann data¹⁰, along

⁹ Authors: Margaret Desmond, Phillip O'Brien and Frank McGovern

¹⁰ www.met.ie

with relevant OPW Flood Risk Management Plans and information sourced from Wexford County Council.

Storm Ophelia

Storm Ophelia was regarded as the worst storm to affect Ireland in 50 years. It made landfall over Ireland on October 16th 2017 with wind speeds of up to 115km/h recorded at Johnstown castle weather station in Wexford. A status red severe weather warning was issued by Met Eireann. The storm caused major power outages, lifted roofs, felled countless trees and caused coastal flooding in Ireland. The tragic loss of three lives was also attributed to Storm Ophelia. All schools and many businesses closed for the day while the nation weathered out the storm. Rainfall was not a feature with the bulk of the rain associated with the storm passing to the west of the country over the Atlantic Ocean. Warnings given about the arrival of Storm Ophelia and advice on self-protection was disseminated to the public by the national and local response services. The aim was to prevent serious injury and loss of life during the storm. It resulted in the country shutting down almost completely on Monday the 16th October. While the county escaped any tragedies during the storm, the rescue of a 10-metre yacht in hurricane force winds could easily have become one. Rosslare lifeboat carried out a very brave rescue of the yacht off the Wexford coast at the height of the storm on Monday and towed the stricken vessel and its three-strong crew to Rosslare Europort.

At around the same time, the biggest individual wave ever recorded off Ireland, an 18-metre (60-foot) monster, was detected by the M5 weather buoy off the Wexford coast.

Wexford's County Councils Emergency Development Committee met at 8.30 a.m on 16th October. The committee directed that the County Hall closed to the public for non-essential services with immediate effect and all staff including staff in the district offices were instructed to go home immediately. Staff from Wexford Town were requested to remain at County hall to assist with the management of the emergency. The severe weather event was managed right throughout the day. Representatives of An Garda Siochana, HSE, and senior staff of the Council were in attendance

The focus on the 16th was on keeping the public safe and the Committee the public in the main co-operated by staying indoors and staying off the roads – thereby keeping themselves safe.

Between 1.00 pm and 6.30 pm on Wexford County Council logged 135 calls to their emergency contact centre at County Hall and Voxpro the Out of Hours emergency contact line logged a further 30 calls up to 9.00am on the morning of the 17th October.

Clean Up

The worst of the storm had abated by 7pm and response crews were mobilised. 140 staff turned their attention to the clean-up operation.

20 items of heavy equipment were used in the task of removing fallen trees.

Priority was given to National Routes, followed by Regional Routes

All National Roads were passable by midnight on 16th October 2017 and all regional roads were clear by 9am on 17th October.

Local roads in Wexford and Gorey Districts were passable the evening of 17th and, while Enniscorthy and New Ross local roads were cleared by 18th October.

All minor debris was cleared from the roads over the following days.

In total over 600 trees blew down

Approximately 7,200 customers in Wexford were without power by Thursday . Crews from Wales assisted in the restoring of power . Due to the high number of electricity outages, issues were experienced in relation to water supply. There was disruption to 24 water supplies countywide.

The public was urged to conserve water in 6 supplies. Water supply was out in 15 supplies.

Generators were supplied in some of these areas to provide supply.

Wexford town largely escaped the wrath of the storm, although the roof at Scoil Mhuire was damaged and trees fell, blocking several suburban roads.

The districts fared worse with damage to businesses and homes reported in Barntown, Taghmon, Kilmore Quay and Davidstown.

Costs: €184,740



Storm Ophelia 16/10/17 Damage to Power lines



Storm Ophelia 16/10/17 Blocked Local road

Storm Emma

Heavy snowfall in March 2018 during Storm Emma caused major disruption in the County. It led to widespread falls of heavy snow with snow depths of 27cm and 43cm recorded on 2nd and 3rd March respectively at Johnstown castle station, Co. Wexford. Snow drifts led to impassible roads, disruption to services including hospital services, water shortages. Costs were calculated for this extreme weather event which are outlined in the table below.

It is likely that similar future events will have costs proportional to this event.

Department	Costs
Emergency Services	239,123.10
Roads & transport	429,270.67
Roads Pay/Overtime	302,717.62
Hire of Plant & machinery	213,045.33
Housing Maintenance	38,078.91
Total Emergency Costs	€ 1,226,335.63

Table 3.2 Costs associated with Storm Emma



Access Road to Edenvale Water treatment works impassable on 7th March 2018



Emergency Services call out 08/03/18

Heatwave Summer 2018

June and July were significantly warmer and drier than average in 2018. A heatwave warning was issued for the South East. In June monthly sunshine totals were highest at Johnstown Castle*, Co Wexford with 279.9 hours (No LTA comparison).

The highest maximum temperature in the county of 35.3°C was recorded at Johnstown Castle. 14.5 hours of sunshine was recorded at J.F.K Park.

This resulted in problems for agriculture and households. Problems included difficulties with water abstraction and stunted grass growth

After five full weeks of very hot weather Wexford County Council issued a hose pipe ban on Radio, local newspapers and the website.

The Fire Service recorded unprecedented number of callouts. The HSE notified hospitals of increase incidents of heat stroke and related issues.

There were at least 50 confirmed serious cases of heat strike reported including some very young children.

A wildfire occurred at the Raven and a number of localised forrest fires and gorse fires affecting beaches were reported. This resulted in a significant increase in emergency service call outs.

Tankered water was provided in a number of rural communities who experience water shortages in their private wells.



Fire at the Raven, Wexford on 22nd July 2018

DRAFT

The following timeline highlights the range and frequency of major events to impact County Wexford.

EXTREME WEATHER EVENTS – COUNTY WEXFORD											
Year	Date	Event Type / Name	Outline Description	Climatic Event							
				Strong Wind	Extreme Rainfall	Heavy snowfall	Sea Level Rise	Low Rainfall	High Temp	Low Temp	
2018	September	Storm Ali	Orange Wind Warning - gale-force winds of up to 120km/h, stormy conditions								
2018	Summer	High Temperatures, Heatwave & drought	High Temperatures, Heatwave and drought - disruption to water supply, issues with road maintenance etc.								
2018	February/March	Storm Emma & Beast from the East	Blizzard / Heavy Snowfall / widespread heavy snow drifting. Disruption to business, emergency services, power cuts etc. South east hit severely								
2017	16 October	Storm Ophelia (Ex-Hurricane Ophelia)	Red warning - gale force winds, heavy rain and storm surges along some coasts (flooding). Disruption to business, power cuts etc. Johnstown castle station recorded gales force winds of 70km/h with gusts recorded of 115km/h at 13.35								
2016	8 th February	Storm Imogen	Localised damage at Donnaghmore Ballygarrett								
2015/2016	Dec/Jan	Storm Frank Heavy Rain and Flooding	Wettest January on record - 126% of monthly long term average Severe Flooding in Enniscorthy town								
2014	11/12 February	Storm Darwin	Red Warning for strong winds - classified a 1 in 20 year event. Wind speed 80-90km/h with Gusts 130-170km/h for Wexford Severe Flooding In New Ross town and Enniscorthy town								
2014	7 January	Coastal storm	Storm tides struck causing localised spot flooding in coastal and rural areas including Wellingtonbridge.Foulksmills, Newbawn, Clongeen, Slade, Dunmain, Horeswood, Fethard and Arthurstown Coastal erosion in Duncannon with 30 metres of the wall knocked down. Wellingtonbridge to Carrig on Bannow also suffered coastal erosion, also the flood wall on the road from Slade to Hook Head								

EXTREME WEATHER EVENTS – COUNTY WEXFORD

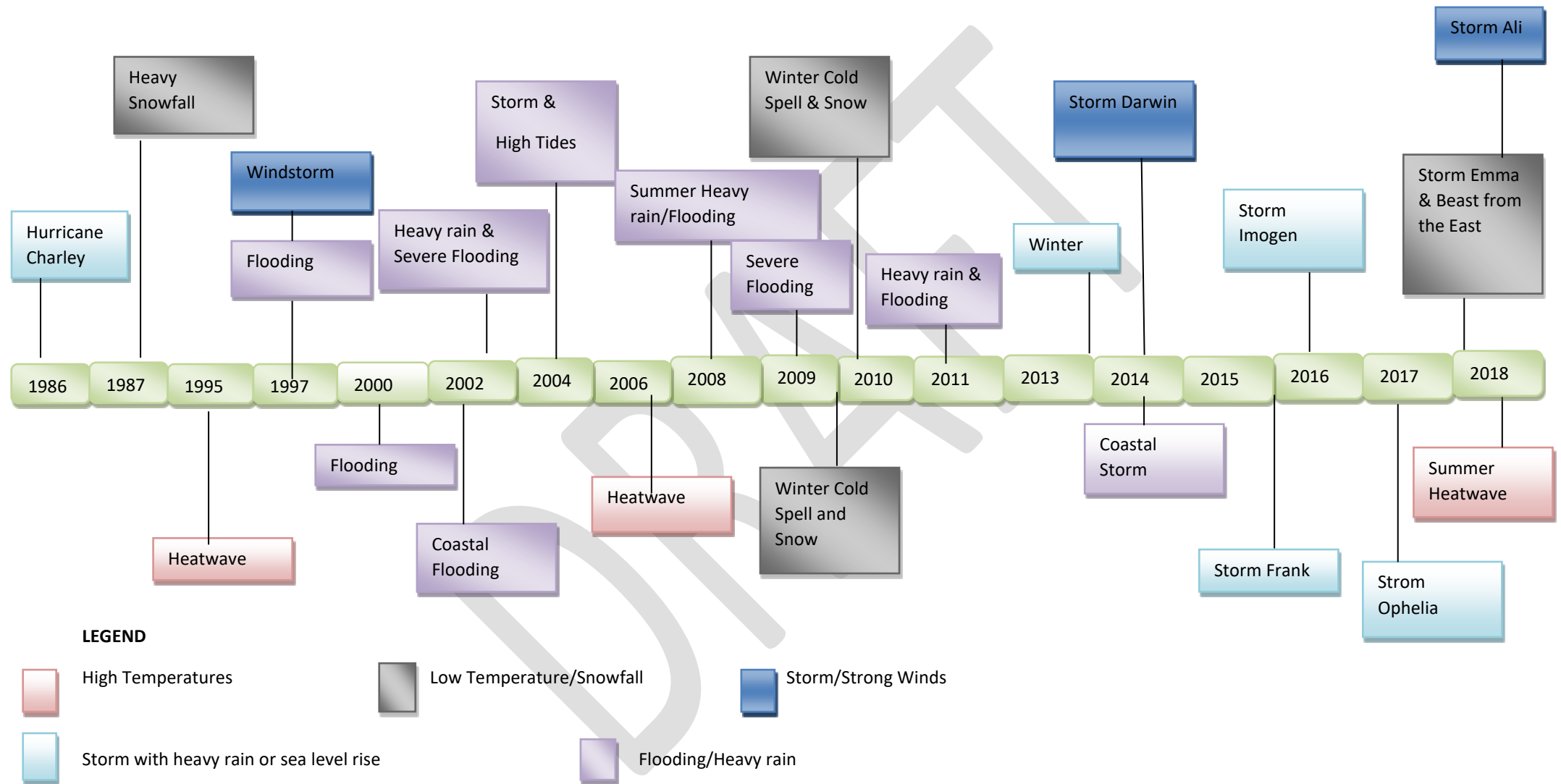
Year	Date	Event Type / Name	Outline Description	Climatic Event						
				Strong Wind	Extreme Rainfall	Heavy snowfall	Sea Level Rise	Low Rainfall	High Temp	Low Temp
2013/14	Winter	Winter Storms	A combination of strong winds, tidal surges and low pressure conspired to cause widespread damage and flooding during the latter half of December 2013 and into the middle of February 2014. Serious coastal damage and widespread, persistent flooding.							
2010	Nov/Dec	Winter Cold Spell	Lowest temperatures on record in Dublin Airport (-8.4 degrees C) and Casemont Aerodrome (-9.1 degrees C) Important factors are the duration of the cold weather, how cold it was and how much snow. This particular cold spell was notable for being the earliest spell of significant duration (started in November). It was also notable for the sustained extreme low temperatures.							
2009/10	Winter	Winter Cold Spell	Coldest winter in almost 50 years (Met Eireann) with extreme low temperature recorded at Johnstown castle of -3.7°C							
2009	November	Severe flooding	Rainfall totals were highest on record; extensive flooding Enniscorthy Quays and main Bridge Flooded							
2008	August	Heavy rain and flooding	Heavy rain and extensive flooding							
2006	Summer	High Temperature / Heat Wave	Warmest summer since record breaking 1996. Temp 31 deg C at casement Aerodrome on 19 th July 2006 (may have been exceeded by 2018)							
2004	November	High Tides & South easterly Gales	Close to 200 businesses were affected by the worst flooding in Wexford town in over fifty years. Premises suffered flood damage, huge amounts of stock were lost and computer systems crashed as the water level rose by 5ft more than normal, wreaking unstoppable havoc in many areas of the town							
2002	14th November	Heavy rain and severe flooding	Severe flooding in eastern areas. Wettest month on record at Casemont Aerodrome River Slaney in Enniscorthy Co. Wexford burst its banks causing hundreds of thousands euro of damage.							
2002	1st February	Coastal Flooding	Eastern and southern coasts - highest tide in 80 years. Gale-force winds combined with the 9 a.m. high tide sent up to two feet of water on to both the north and south quays of New Ross town.							

EXTREME WEATHER EVENTS – COUNTY WEXFORD

Year	Date	Event Type / Name	Outline Description	Climatic Event						
				Strong Wind	Extreme Rainfall	Heavy snowfall	Sea Level Rise	Low Rainfall	High Temp	Low Temp
2000	5th November	Severe Flooding	11-142mm rainfall Wicklow/Dublin & 70-98mm rainfall Tipperary / Waterford Flooding of Enniscorthy town Localised flooding in rural areas							
1997	3 rd – 7 th August	Extreme rainfall and Flooding	Persistent rainfall in South East 3 rd – 7 th August Most affect areas included Blackwater and Cahore , Co. Wexford.							
1997	24 December	Windstorm	Gusts up 90mph							
1995	Summer	High Temperatures, Heatwave & drought	Warmest Summer on record. Mean temperatures over 2 degrees C above normal. Temp rises to 30 degrees C over a number of consecutive days.							
1987	12-13 January	Heavy Snowfall	6 -10cm snow recorded in South east							
1986	August	Hurricane Charley	Strong winds and rain, worst flooding in 100 years							

Table 3.3 Extreme Weather Events for County Wexford

Major Weather Event Timeline Co Wexford



It is evident when assessing the climatic hazards that there are five main climatic categories that are relevant to Wexford County Council. These are Coastal Storms and Flooding (including storm surge), Wind Storms, extreme rainfall events, extreme heat/drought events, and freezing conditions/snow events. Combination events i.e. two extreme climatic events occur simultaneously are noted also. Such combination events give rise to more severe and destructive impacts. While some events such as storm events can and are expected to bring with them extreme rainfall, other less usual combination events such as an extended dry period/heatwave followed quickly by an extreme rainfall event or heavy snow event followed by heavy rainfall bring about new and significant impacts.

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

In the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC 2014) mean sea level is predicted to rise and the frequency and severity of coastal storms is predicted to increase. These consequences of Climate change will significantly increase the risks posed by coastal erosion and coastal flooding. The extent of coastal erosion in Ireland has been documented in the South East and South Coast Irish Coastal Protection Strategy Studies carried out by Department of Communications, Marine and Natural Resources. Coastal flood hazard exists predominantly in or near coastal settlements with three primary areas of potential coastal flood risk identified in Wexford. These areas are Cahore Point to Morriscastle, Wexford to Curracloe and Rosslare. The extent of the predictive floodplain for each of these primary areas of potential coastal flood risk is detailed in the study. Resulting erosion maps are also presented in the report. A review of the erosion maps generated throughout the study area showed that there were six primary areas (Kilpatrick, Ardamine, Glascarrig, Killincooly to Blackwater, Blackwater to Ballinesker and Rosslare) of potential coastal erosion risk identified in County Wexford South East Coast.

Similar maps are presented which identify primary areas of potential coastal flood risk for the South Wexford Coast (Tacumshin, Kilmore Quay to Cullenstown, Wellingtonbridge).

Resulting erosion maps are also presented in the report. A review of the erosion maps generated throughout the study area showed that there were four primary areas of potential coastal erosion risk in County Wexford identified as Tacumshin to Kilmore Quay, Ballyteige Burrow to Cullenstown, Fethard.

A baseline assessment of the impacts and associated consequences for the various operational areas of Wexford County Council was compiled following the workshop in December and follow up meetings held with the various sections. In addition to a description of the consequences the level of disruption associated with the hazard for the delivery of services by Wexford County Council is also given in Table 3.4

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

The baseline assessment data is presented for the various Climate Hazards below in Table 3.5

Table 3.5 Baseline Assessment

Climate Hazard (Event):		Strong Winds				
Meteorological/ Climatological Conditions:		Red Warning mean gusts >80km/h Gusts in excess of 130km/h	Coastal Warning Violent Wind storm force 11 or greater			
		Orange Warning mean gusts 65 – 80km/h Gusts 110 – 130km/h	Coastal Warning Violent Wind storm force 10 (mean)			
		Yellow warning mean gusts 50 -65km/h Gusts 90 – 110km/h	Coastal Warning Wind Gale force 8 or 9 (mean)			
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	Building Closure dues to damage	All Local Authority Staffed buildings	Provision of reduced service with reduced staff	3	Service Disruption to Customers due to closed building and/or staff shortages	Mapalerter and Twitter have a combined subscribers of 14500 to facilitate public awareness and information
	Electricity Supply affected with effect on servers		Implement Business continuity plan for critical service disruption		Impact on Reputation of LA to effectively manage extreme event	
	Ability of staff to get Safely to work and work under safe conditions	Outdoor staff/Drivers	Roll out of paperless strategy to facilitate more remote business operations		Inability to meet statutory deadlines eg Planning	
	Loss of essential services		Mapalerter notification system to public re disruption to services and/or closures of roads/buildings etc Back up facilities off site to		Stretch of staff resources Loss of Revenue due to closure	

			<p>minimize risk</p> <p>Staff able to work from alternative base</p>			
Roads & pathways	<p>Infrastructure collapse, significant damage</p> <p>Blocked roads & pathways</p> <p>Impact on construction projects</p>	<p>All National Regional and Local Roads across the county</p> <p>Urban and rural pathways</p>	<p>Severe Weather Response Plan</p> <p>Reactive removal of fallen trees wires and debris</p> <p>Risk Assessment of Trees located near critical Infrastructure</p> <p>Reactive removal of blockage & repair</p>	3	<p>Risk to Public safety</p> <p>Financial Implications due to unscheduled maintenance repair and upgrade</p> <p>Blocked Roads with knock on affect accessing other services</p> <p>Isolation of rural communities from local rural road blockages</p>	Department of Transport , Tourism and Sport
Local Authority Building and Social Housing	<p>Damage and deterioration of La Buildings and social houses including vacant /dangerous structures</p> <p>Scaffolding for construction projects potential compromised</p>	<p>All LA buildings and housing stock especially coastal houses and dangerous structures</p> <p>LA buildings under construction in particular exposed areas</p>	<p>Reactive emergency Repair</p> <p>Ongoing maintenance plans</p> <p>Programme and surveys of existing vacant and dangerous properties to prioritise and make usable older buildings</p> <p>Stand down until storm warning passes</p> <p>Assess & establish level of damage to scaffold & safety</p>	2	<p>Cost of additional Maintenance</p> <p>Possible rehousing tenants where structure compromised or power outages</p> <p>Additional pressure on staff resources</p> <p>Deadlines for projects not met/extended</p>	Department of housing, Planning and Local Government
Water And Wastewater Services	<p>Reduced and/or unreliable power supply for pumping and treatment</p> <p>Damage to water</p>	<p>All Water Treatment and wastewater Treatment plants</p>	<p>Existing Telemetry and scada facilitates some remote response</p> <p>Temporary and Permanent</p>	3	<p>Disruption to the provision of water supply and wastewater Treatment</p> <p>Overflow from wastewater</p>	<p>ESB</p> <p>Irish water</p>

	<p>abstraction and wastewater infrastructure</p> <p>Overflow from wastewater systems due to power outages</p> <p>Saline intrusion of waters</p>	<p>Water and wastewater facilities especially those located near trees</p>	<p>backup generators</p> <p>Removal of trees/debris and repair of wastewater or water infrastructure</p>		<p>Treatment systems affecting water quality</p>	
Spatial Planning & Land Use	<p>Damage to property, people, infrastructure e.g telecommunications, natural and built heritage due to the siting of these developments in areas at increased risk.</p> <p>Increased coastal erosion due to storm surges</p>	<p>Uplands, coastal areas, exposed areas. Building heights and microclimate/wind tunnels in urban areas.</p>	<p>Rural housing siting and design guidance in the County Development Plan.</p> <p>Ensuring new development is appropriately located in coastal areas vulnerable to erosion.</p> <p>Application of relevant Section 28 Guidelines e.g. Sustainable Residential Development in Urban Areas, Design Guidelines for Apartment Developments.</p>	3	<p>Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.</p>	<p>Infrastructure providers e.g TII, ESB and Irish Water, OPW, National Monuments Services</p>
Drainage and Flood Management	<p>Inundation of stormwater infrastructure(combined events)</p> <p>Inadequate Drainage Capacity (combined events)</p> <p>Reduced/Unreliable power</p>	<p>All areas in particular areas subject to flooding</p>	<p>Provision of sand bags (combined events)</p> <p>Reactive removal of fallen trees/debris</p> <p>Maintenance Programme for surface water drains</p> <p>High Level alarm in high risk</p>	3	<p>Risk to Life</p> <p>Disruption to communities</p> <p>Local surface water flooding events (combined events)</p> <p>Impact on waterbodies due to power outages and combined sewer overflows</p>	<p>OPW</p> <p>Irish water</p>

	supply for pumping		<p>areas (River Slaney Advance warning system)</p> <p>Flood Barriers to properties</p> <p>Non-return Valves installed on surface water systems</p>		Damage to properties	
Coastal	<p>Increased coastal erosion due to storm surges.</p> <p>Abandonment of properties.</p> <p>Damage to existing coastal defences.</p> <p>Erosion / accretion of sand on coastal areas.</p> <p>Damage to piers and harbours, marinas & slipways.</p> <p>Damage to temporary structures such as lifeguard huts, temporary bridges.</p>	<p>Coastal areas.</p> <p>Properties adjacent to areas of high risk of erosion.</p> <p>Coastal Communities</p>	<p>Adhere to Coastal Zone Management Section of County Development Plan.</p> <p>Monitoring And Inspection programme for vulnerable areas of coast</p> <p>Monitor and Maintain Piers, marinas and quays</p> <p>Ensure private coastal defence is properly designed.</p> <p>Monitor and maintain public coastal defences.</p> <p>Mapalerter an twitter Notifications</p>	3	Coastal erosion and damage to coastal Infrastructure	Infrastructure providers e.g TII, ESB and Irish Water, OPW, National Monuments Services
Community Health & wellbeing	<p>Inaccessibility to rural area of county</p> <p>Damage to properties streetscapes parks and community assets</p>	Remote rural Locations	<p>Development of the Community resilience Group</p> <p>Emergency response call out</p> <p>Mapalerter Notification system</p> <p>Repair and/or replace with robust materials</p>	2	Increased Isolation and disconnect of communities	Department of Health

Water Quality	<p>Overflow from wastewater systems due to power outages</p> <p>Saline intrusion of waters</p>	<p>Water bodies in vicinity of wastewater systems</p> <p>Coastal waters</p>	<p>Provision of generators at water/wastewater plants</p> <p>Remote monitoring of wastewater treatment systems</p>	2	<p>Decrease in Water Quality due to wastewater overflow</p>	<p>Department of Housing, Planning and Local Government</p>
Biodiversity	<p>Increased pressure on Dune systems in coastal areas</p> <p>Loss of Biodiversity</p>	<p>County wide</p> <p>Coastal areas</p>	<p>Biodiversity Action Plan</p>	3	<p>Inability to meet objectives to protect species and habitats</p>	<p>NPWS</p>
Emergency Services	<p>Increased number of trees down leading to increase response time to incidents</p> <p>Increase in number of Water station Failures</p>	<p>County Wide</p>	<p>Severe Weather Plan</p> <p>Major Emergency plan</p>	2	<p>Isolated but noticeable examples of service decline</p> <p>Minor Environmental damage</p>	<p>Irish Water</p>

Climate Hazard (Event):		Extreme Rainfall				
Meteorological/ Climatological Conditions:		Red Warning 70mm or greater in 24 hours Orange Warning 50mm-70mm in 24 hours Yellow Warning 30 -50mm in 24 hours				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	Building Closures due to flooding Electricity Supply affected Safety of Staff & ability to get to work	All Local Authority Staffed buildings Outdoor staff/Drivers	Provision of reduced service with reduced staff Facilitate staff to work from other LA base Roll out paperless strategy to facilitate remote business operations Increased call out Vaccinations up to date for staff working in floods Mapalarter Notification system to public re disruption to services and/or closures	3	Service Disruption to Customers Loss of Reputation Inability to meet statutory deadlines eg Planning Stretch of staff resources Loss of Revenue due to closure	Provision of more E business to facilitate continuation of business
Roads & Pathways	Infrastructure collapse, significant damage due to flooding Blocked roads Impact on construction projects Faster rate of	All National Regional and Local Roads across the county	Transport Infrastructure Ireland carry out mechanical surveys of roads to ascertain level of risk which can be used as risk rating tool to prioritise works Emergency works	2	Risk to public safety Financial implications for unscheduled maintenance & repair Reduced economic efficiency of road network for commuting traffic and	Department of Transport., Tourism and Sport, Transport Infrastructure Ireland

	deterioration in roads due to prolonged exposure of road surfaces to flooding				emergency Occurrence of accidents driving on water logged/ flooded roads Time delays and cost implications for construction projects	
Local Authority Building and Social Housing	<p>Flooding and water damage to LA buildings and social housing and vacant and dangerous structures</p> <p>Deterioration in road surface for access roads under construction</p>	<p>LA buildings and housing stock located in flood zones and in coastal areas</p> <p>Vacant/dangerous structures</p> <p>LA housing roads on construction sites</p>	<p>Repair and improve drainage network</p> <p>Provision of sand bags and flood gates to vulnerable properties</p> <p>Rehouse where houses flooded</p>	2	<p>Cost of additional Maintenance</p> <p>Possible rehousing tenants where structure compromised or power outages</p> <p>Additional pressure on staff resources</p>	Department of Housing, Planning and Local Government
Water & Wastewater Services	<p>Flooding and Inundation of water abstraction and wastewater infrastructure</p> <p>Increased peak flows</p> <p>Quality of raw water compromised in water abstraction</p> <p>Impact on supply in Network</p> <p>Private Wastewater treatment systems inundated</p>	<p>Water & wastewater infrastructure located within flood zones/ low lying land</p> <p>Private systems located in poor drainage areas and/or flood zones</p>	<p>Install electrical equipment above flood levels</p> <p>Reactive Repair</p> <p>Telemetry and scada systems facilitates some remote response</p> <p>Temporary and Permanent backup generators</p>	3	<p>Health consequence with poor quality water</p> <p>Increase staff costs & overtime</p> <p>Cost of repair and maintenance of infrastructure</p>	IW Water services

Spatial planning & Land Use	<p>Risk of flooding of vulnerable land uses e.g residential, hospitals, nursing homes, infrastructure including wastewater treatment plants due to the siting of these developments in areas at risk.</p> <p>Potential disruption to people, business (economic activity) and infrastructure.</p> <p>Biodiversity-impacts of siltation</p> <p>Public health impacts if wastewater treatment plants/slatted tanks (agriculture) flooded.</p>	<p>Areas along rivers, coastal areas, areas with certain soil and rock conditions,</p> <p>urban areas (due to the extent of hard surfaces), Uplands areas (land slippage),</p>	<p>Flood risk mapping is used. Section 28 Flood Risk Management applied in the preparation of development plans and local area plans (Strategic Flood Risk Assessment) and at project/site level (Site-Specific Flood Risk Assessment).</p> <p>The inclusion of SUDS polices and development management standards in plans.</p> <p>Protecting and enhancing green infrastructure in the county and incorporate into land use planning(Objective GI01 CDP)</p> <p>Land susceptibility assessments are required for wind energy development (Wind Energy Strategy).</p> <p>Appropriate assessment considers flow paths and vulnerability to flooding.</p>	<p>3</p>	<p>Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.</p>	<p>OPW, NPWS, IFI, HSE</p>
Drainage and Flood Management	<p>Inundation of storm water infrastructure</p> <p>Inadequate Drainage Capacity</p> <p>Reduced/Unreliable power supply for pumping</p> <p>Inflow/Infiltration into wastewater networks</p>	<p>All areas in particular areas subject to flooding</p>	<p>Provision of sand bags (combined events)</p> <p>Reactive removal of fallen trees/debris</p> <p>Maintenance Programme for surface water drains</p> <p>High Level alarm in high risk areas</p> <p>Flood Barriers to properties</p> <p>Non-return Valves installed on surface water systems</p>	<p>3</p>	<p>Risk to Life</p> <p>Disruption to communities</p> <p>Local surface water flooding events (combined events)</p> <p>Impact on waterbodies due to combined sewer overflows</p> <p>Requirement for larger</p>	<p>OPW</p> <p>Irish water</p>

					attenuation systems Increase pumping costs Financial costs	
Coastal	Run-off from rivers affecting bathing water quality. Overflows from WWTP affecting bathing water quality. Cliff stability issues (e.g. Rosslare Harbour area). Deterioration of beach accesses.	Bathing waters adjacent to rivers and estuaries. Bathing areas adjacent to WWTPs and overflows. Coastal areas with high cliff embankments and poorly drained soil.	Bathing waters are sampled and tested before and during bathing season. Monitoring and inspection programme for vulnerable areas of coast	3	Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.	OPW, NPWS, IFI, HSE
Community Health & wellbeing	Inaccessibility to remote or flood risk areas of county Damage to properties streetscapes parks and community assets Closure of schools crèches	Remote rural Locations and areas located in flood zones	Pumping and provision of sandbags and flood barriers to at risk property owners Establishment of the community resilience group team Mapalserter & Twitter notification system Repair and/or replace with robust materials	2	Increased Isolation and disconnect of communities Additional cost of provision of more weather resilient community assets	PPN & Community Resilience groups
Water Quality	Surface water run-off	All water bodies especially in areas sloped landscape	Buffer zones on agriculture land in accordance with GAP regs	2	Deterioration of water quality due to surface water run-off	Department of Agriculture, Food and the marine

Emergency Services	<p>Reduced access to county if Slaney river floods at Enniscorthy.</p> <p>Increase in numbers of fire calls to assist in property protection due to floods</p> <p>Increase in response times due to restricted access.</p>	<p>Enniscorthy Town</p> <p>New Ross</p> <p>County Wide</p>	<p>Flood Plan</p> <p>Major Emergency plan</p>	<p>3</p>	<p>Service provision under severe Pressure at community level</p> <p>Small number of injuries</p>	<p>Ambulance service</p> <p>Garda Siochana</p> <p>Civil Defence</p> <p>Irish Coast Guard</p>
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Climate Hazard (Event):		Heavy Snowfall/Low Temperatures				
Meteorological/ Climatological Conditions:		<p>Red warning Significant falls of snow likely to cause accumulations of 8cm or greater below 250m above mean sea Level Low Temp minima of -10°C or lower expected maxima -2 °C expected</p> <p>Orange warning Significant falls of snow likely to cause accumulations of 3cm or greater below 250m above mean sea Level Low Temp minima of -5 °C to -9 °C expected Maxima of 0 °C or -1 °C expected</p> <p>Yellow Warning Scattered snow showers giving accumulations of less than 3cm below 250m above mean sea level Low Temperature minima of -3 °C or -4 °C expected. Maxima of 1 °C or 2 °C</p>				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	<p>Building Closure dues to snow</p> <p>Electricity Supply affected with effect on services and technology</p> <p>Inability of staff to get to work or travel for work</p> <p>Increased risk to safety of staff</p>	<p>All Local Authority Staffed buildings</p> <p>Outdoor staff/Drivers</p>	<p>Provision of reduced service with reduced staff</p> <p>Facilitate staff to work from other LA base unaffected</p> <p>Provision of PPE</p> <p>Roll out of paperless strategy to facilitate remote business operations</p> <p>Emergency Response</p> <p>Increased call out</p> <p>Use of 4 x 4 and weather appropriate vehicles for access</p>	3	<p>Service Disruption to Customers</p> <p>Loss of Reputation if L.A under severe pressure to continue to operate under extreme conditions</p> <p>Inability to meet statutory deadlines eg Planning</p> <p>Stretch of staff resources</p> <p>Loss of Revenue due to closure</p>	<p>Provision of more E business to facilitate provision of business remotely</p>

Roads & Footpaths	<p>Prolonged exposure of road to extreme low temperatures</p> <p>Changes in rates of deterioration - faster rate of deterioration in areas subject to sustained low temperatures or combination events</p> <p>Infrastructure collapse, significant damage – sustained duration and frequency of extreme events.</p> <p>Impact on construction projects</p> <p>Blocked Roads</p>	<p>All National Regional and Local Roads across the county</p>	<p>Application of salt and/or grit on National & Regional roads when advance low temperature warning in place</p> <p>Reactive repair</p> <p>Use of more resilient materials in new projects</p> <p>Use of appropriate vehicles for snow conditions</p> <p>Use of snow plough and snow loaders for road clearing</p> <p>Use of snow chains or snow socks</p>	<p>3</p>	<p>Change in material used in roads to accommodate extreme low temperatures</p> <p>Cost implication for higher specifications for road surfaces</p> <p>Cost implications for unscheduled maintenance, repair, upgrade & staff overtime</p> <p>Risk to motorist & public safety</p> <p>Risk to public safety due to slips trips and falls</p>	<p>Department of Transport., Tourism and Sport,</p> <p>Transport Infrastructure Ireland</p> <p>Transport Infrastructure Ireland carried out mechanical survey of regional roads to assess risk levels Can be used to develop risk rating tool in prioritising maintenance works</p>
Local Authority Building and Social Housing	<p>Damage and deterioration of housing stock</p> <p>Requirement for additional heat and additional insulation of housing stock</p> <p>Possible Hypothermia of homeless/ vulnerable people</p> <p>Impact on supply of construction materials</p> <p>Impact on housing construction projects including access roads</p>	<p>All Houses particularly older housing stock</p> <p>Homeless people</p> <p>New developments under construction</p>	<p>Improvement of insulation & energy efficiency of LA housing stock through retrofit projects</p> <p>Provision of temporary shelter during snow/extreme cold period</p> <p>Temporary suspension of projects as some construction techniques</p>	<p>3</p>	<p>Additional cost of upgrade of insulation & retrofit</p> <p>Additional maintenance repair costs</p> <p>Possible rehousing of tenants</p> <p>Pressure on housing staff</p> <p>Additional cost of fuel</p> <p>Cost implications of provision of temporary shelters</p> <p>Delays in timelines for</p>	<p>Department of Housing, Planning and Local Government</p>

			cannot be carried out in extreme conditions		delivery of housing projects	
Water and wastewater Services	<p>Insufficient treatment of wastewater due to interruption in wastewater treatment process</p> <p>Access to water /wastewater infrastructure impacted if road impassable/unsafe</p> <p>Pressure on drinking water supply/provision in particular private wells due to freezing</p>	<p>All wastewater plants</p> <p>All water supplies especially private wells</p>	<p>Repair and maintenance of impacted infrastructure</p> <p>Remote monitoring</p> <p>Telemetry and scada systems facilitates some remote response and/or monitoring</p> <p>Tankering of water to rural communities</p>	2	<p>Financial implication</p> <p>Possible service disruption</p> <p>Inadequate treatment of water/wastewater as access to infrastructure compromised</p> <p>Additional cost in provision of water</p>	IW
Land Use & Development	<p>Impacts on people who reside in isolated locations-cut off with no access to services e.g. GPs/chemists/hospitals</p> <p>Impacts on infrastructure, e.g. electricity supply.</p> <p>Inability to make a submission on a draft plan (if near the closing date).</p> <p>or to adopt a plan The CEO would have to make the plan if it was the last day of the plan making period. Members would lose their right to carry out their reserved function to make a plan.</p>	<p>Upland areas-remote communities</p> <p>Coastal areas and coastal communities</p> <p>Council HQ</p>	<p>The Settlement Strategy is centred on the development of towns and villages where services are more likely to be operational, albeit at a reduced level.</p> <p>E-Business and roll out of Pilot E-Planning project & paperless strategy</p>	3	<p>Service provision under severe pressure. Appreciable decline in service provision at community level</p> <p>Inability to meet statutory requirements which could have significant legal implications for the planning authority.</p>	<p>HSE</p> <p>Department for Housing, Planning and Local Government</p>
Coastal	Erosion due to freeze / thaw on unstable cliffs.	Coastal areas and coastal	Monitor and inspect vulnerable areas of the	3	Service provision under severe pressure. Appreciable	HSE, OPW Department of

	Access to vessels at piers & harbours compromised/unsafe	communities Piers harbours and coastal roads	coast regularly in particular after these weather events. Prioritise major fishing piers/harbours for clearance as best practice	2	decline in service provision at community level Economic effect on fishing industry Safety of vessels	Agriculture, Food and the Marine Civil Defence
Community Health & Well being	Inaccessibility to rural areas of county Damage to properties streetscapes parks and community assets	Remote rural Locations and areas located	Establishment of the community resilience group team Mapalarter & Twitter notification system	2	Increased Isolation and disconnect of communities Additional cost of provision of more weather resilient community assets	PPN & Community Resilience groups
Emergency Services	Extreme low temperatures leading to increased number of incidents (especially ambulance assists), delayed response times, reduced access and increased frozen hydrants	Country Wide Ambulance Service Blue Light Services	Severe Weather Plan 4x 4 Jeeps Snow Chains 24 hr standby	3 4	Severe disruption or failure of services failure Financial implications	National Ambulance Service HSE An Garda Siochana Dept. of Defence Civil Defence Irish Red Cross Order of Malta
Biodiversity	Loss of species or habitat	County wide	Review of Biodiversity action plan	3	Inability to meet objectives to protect biodiversity	NPWS
Water Quality	Changes in species distribution and phenology of river systems	County wide	WFD monitoring programme	3	Changes in river habitats	Department of Housing, Planning and Local government

Climate Hazard (Event):		Sea Level Rise				
Meteorological/ Climatological Conditions:		Between the period 1901 – 2010, global sea level has been rising at a rate of 1.9mm/year. From 1980 – 2010 sea level was rising at 3mm/year Satellite observations indicate the sea level around Ireland has risen by approximately 4-6cm since early 1990s				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	Impact on coastal businesses and industries	Coastal industry and communities	Mapalarter notifications	3	Increase in Insurance Costs Increased demands on local authority services and disruption to services	
Local Authority Buildings and Social Housing	Flooding and water damage to LA buildings and social housing and dangerous and vacant buildings in coastal regions	LA buildings and housing stock located in coastal areas	Monitor and inspect buildings in vulnerable areas of coast	2	Cost of additional Maintenance Possible rehousing tenants where structure compromised or damaged Additional pressure on staff resources	
Coastal	Increased levels of erosion with associated loss of land and property. Loss of amenities including access to bathing waters. Piers and harbours not capable of providing safe launching and berthing.	Coastal areas and coastal communities Inland areas under tidal influences. Local fishing industry and	Sea level change incorporated into flood risk mapping. Restrict development outside the boundaries of existing coastal settlements (CZM09 and CZM10). Direct new	3	Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.	OPW, NPWS, BIM Inland Fisheries

	Impacts on coastal ecosystems, potential loss of natural and built heritage.	community.	development away from these areas. New development to mitigate against and adapt to climate change through the location, layout and design of the development (Objective CC09).			
Water/Wastewater	Salinisation of surface and groundwater supplies	Coastal areas	Source alternative water supplies	3	Increase cost implications Disruption to service	IW
Roads & Pathways	Infrastructure damage	Coastal roads pathways	Sea level change incorporated into flood risk mapping Coastal protection works Severe Weather Response Plan	3	Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.	
Spatial Planning Policy Land Use & Development	Loss of land, property, infrastructural assets due to location in areas at risk. Possible abandonment of properties. Early retirement of coastal protection works which are no longer effective due to the rise in sea level/ overtopping. Public health implications if slatted tanks/wastewater treatment plants	Coastal areas and coastal communities Inland areas under tidal influences.	Sea level change incorporated into flood risk mapping. Restrict development outside the boundaries of existing coastal settlements (CZM09 and CZM10). Direct	3	Increased demands on local authority services, disruption to services/ infrastructure provision, potential environmental damage.	OPW, NPWS

	affected. Impacts on coastal ecosystems, potential loss of natural and built heritage.		new development away from these areas. New development to mitigate against and adapt to climate change through the location, layout and design of the development (Objective CC09).			
Community Health & Well being	Inaccessibility to certain coastal areas of county Damage to properties streetscapes parks and community assets located in coastal areas	Coastal Locations	Establishment of the community resilience group team Mapalarter & Twitter notification system	2	Increased Isolation and disconnect of coastal communities Additional cost of provision of more weather resilient community assets	PPN & Community Resilience groups
Emergency Services	Reduced Access to coastal areas for emergency service provision	Coastal Areas	Severe Weather Plan	2	Delays in emergency service provision to affected areas	Ambulance Fire Service
Biodiversity	Loss of Biodiversity	Coastal areas	Biodiversity Action plan	3	Inability to meet objectives for protection of species and habitat	NPWS

Climate Hazard (Event):		Low Rainfall/Drought				
Meteorological/ Climatological Conditions:		Rainfall projections for Ireland show significant decreases in mean annual, spring and summer precipitation amounts by mid-century. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer. The projected increases in dry periods are largest for summer,				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	Inadequate water supplies for proper functioning of business	All business but in particular Rural business dependent on private water supplies more vulnerable	Operate at reduce level	3	Economic implications Service disruption to business Disruption to community arts/cultural events	
Water and wastewater Services	Quality of water diminished Changes in availability of groundwater Odour issues associated with wastewater treatment plants Shortage of water supplies	Ground and River water supplies Private wells Wastewater Treatment plants	Restrict water pressure and or supply for periods Tankering of water to rural communities on private supplies	3	Requirement for hose pipe bans and restrictions on water supply/pressure Additional demands on staff Health consequences with inadequate supply of quality water particularly to vulnerable groups	Irish water
Coastal	Landslides and slippages. Restricted water supply at coastal	Coastal areas. Coastal areas, tourism,	Monitor and Evaluate	3	Increased demands on local authority services to provide water supplies,	IFI, NPWS, Irish Water

	<p>areas.</p> <p>Natural coastal defence, e.g. sand dunes.</p> <p>Issues with Inland navigation of vessels</p>	<p>bathers, fishing industry.</p> <p>Inland waters</p>			<p>potential environmental damage</p>	<p>Waterways Ireland</p>
<p>Land Use & Development</p>	<p>Low water tables-reduction in private water supplies for residential properties.</p> <p>Low water levels in rivers-impacts on biodiversity.</p> <p>Control of dust e.g. quarrying activities</p>	<p>Outside of settlements (where dependent on private supplies), agricultural lands/crops/irrigation</p>	<p>The Settlement Strategy is centered on the development of towns and villages where services including public water supply are more likely to be operational, albeit at a reduced level.</p> <p>Development Management Standard to incorporate water conservation measures into all new developments.</p> <p>As for the relevant Section 28 Guidelines/Best Practice Guidelines.</p>	<p>3</p>	<p>Increased demands on local authority services to provide water supplies, potential environmental damage</p>	<p>IFI, NPWS, Irish Water</p>
<p>Biodiversity</p>	<p>Shift in distribution of plant and animal species</p> <p>Loss of habitats and biodiversity</p>	<p>Rivers</p>	<p>Water framework Directive monitoring programme</p> <p>Biodiversity action Plan</p>	<p>3</p>	<p>Inability to meet objectives to protect and conserve important habitats & species</p> <p>Negative health and wellbeing of communities</p>	<p>NPWS</p>

Water Quality	Increased potential for water contamination due to low flows and inadequate assimilative capacity	All rivers especially smaller streams with low flow	WFD monitoring programme	3	Threat of fish kills due to diminished flow and oxygen levels Inability to meet WFD objectives	
Emergency Services	Insufficient Water supply for emergency events	County Wide especially rural water supplies	Alternative water supplies	3	Inadequate response to emergency	Irish Water Water services

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Climate Hazard (Event):		High Temperatures				
Meteorological/ Climatological Conditions:		Red Warning Maxima in excess 30°C or minima in excess of 20 °C persisting for 2 or more consecutive nights Orange warning Maxima in excess 30°C or minima in excess of 20 °C expected in 24 hr period Yellow warning Maxima in excess of 27°C expected				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Factors
				Level	Description	
Business Operations and Efficiency	Heat exhaustion & sunburn working in direct sunlight Heat Exhaustion	Outdoor staff	Provision of sun protection clothing and sun cream & PPE Fans Air Cooling in offices	3	Staff unable to perform efficiently	Ancillary Safety Statement
Spatial Planning Policy Land Use & Development	Fires-proximity of people and vulnerable properties to forests, gorse, sand dunes. Overheating of vulnerable properties e.g. dwellings, nursing homes, and crèches. Impacts on biodiversity/eco systems and impact on cultural heritage, e.g soil drying out could destabilise monuments. Increased usage of beaches (the need to plan for	Uplands, mountains, gorse areas, coastal areas (sand dunes) Exposed areas, urban areas Vulnerable people (young and older).	New development to mitigate against and adapt to climate change through the location, layout and design of the development (Objective CC09 in CDP). CDP includes a policy to provide support facilities	3	Increased demands on local authority services, potential environmental damage	National Monuments Services, OPW, NPWS

	facilities at these locations- showers, toilets, car parks etc).		at the county's bathing areas (Objective CZM34)			
Roads	<p>Melting of road surface due to extreme high temperatures leading to decrease in skid resistance</p> <p>Changes in rates of deterioration - faster rate of deterioration in areas subject to sustained high temperatures or combination events</p> <p>Infrastructure collapse, significant damage – sustained duration and frequency of extreme events.</p> <p>Impact on construction projects – all extreme weather events including high temperature</p>	<p>Regional Roads</p> <p>Local Roads across the county</p> <p>Regional & Local Roads</p> <p>Regional & Local Roads</p>	<p>Emergency works such as application of sand & grit</p> <p>Transport Infrastructure Ireland carry out mechanical surveys of roads to ascertain level of risk which can be used as risk rating tool to prioritise</p>	<p>3</p> <p>3</p>	<p>Increase in accident rates due to decrease in skid resistance and surface texture</p> <p>Cost implications for unscheduled maintenance, repair, upgrade & staff overtime</p> <p>Risk to motorist & therefore public safety</p> <p>Consider change in materials used to accommodate higher temperatures</p>	<p>Department of Transport., Tourism and Sport, Transport Infrastructure Ireland</p> <p>Transport Infrastructure Ireland carried out mechanical survey of regional roads to assess risk levels Can be used to develop risk rating tool in prioritising maintenance works</p>
Local Authority Building and Social Housing	Damage to Housing Stock due to extreme high temperatures	Older Housing stock Protected/vacant structures	Programmes and surveys to prioritise at risk properties	2	Economic cost of maintenance	Department of Housing National monument services
Coastal	<p>Fires from barbeques and bonfires. Injury to persons and damage to property and natural habitats.</p> <p>Increased usage of beaches</p>	<p>Coastal areas (sand dunes)</p> <p>Coastal areas,</p> <p>Vulnerable people</p>	<p>Leave no Trace scheme in place for beaches.</p> <p>Beach Bye Laws</p> <p>New development to mitigate against and adapt</p>	3	<p>Fires from barbeques and bonfires. Injury to persons and damage to property and natural habitats.</p> <p>Increased usage of beaches</p>	<p>Coastal areas (sand dunes)</p> <p>Coastal areas,</p> <p>Vulnerable people</p>

	(the need to plan for facilities at these locations-showers, toilets, car parks etc).	(young and older).	to climate change through the location, layout and design of the development (Objective CC09 in CDP). CDP includes a policy to provide support facilities at the county's bathing areas (Objective CZM34)		(the need to plan for facilities at these locations-showers, toilets, car parks etc). Increased pressure on LA services including emergency services	(young and older).
Water & Wastewater Service	Drop in river and ground water levels resulting in water supply reduction Significant increase in demand on services in tourist areas Blockages in Foul pumping stations following drought conditions	Groundwater and river waters more sensitive Coastal areas	Switching from surface water to groundwater supplies Alternative borehole supplies to supplement or replace Cleaning program in place	3	Decrease in water supply and pressure Increase cost associated with tankering of water supplies to rural areas Blockages in pumps resulting in impact on water quality	Irish water Water Services
Water Quality/Biodiversity	Changes in ecosystems and biodiversity from increased temperatures Deterioration of Water Quality including bathing water due to low flow/high temperature	River systems Natural Habitats Rivers and groundwater	Monitoring of systems Waters program Biodiversity action Plan Water Quality Monitoring in accordance WFD	3	Inability to meet objectives to protect and conserve habitats Effect on habitats, Species and biodiversity Inability to meet water Quality Objectives	NPWS EPA
Emergency services	Increased risk of wild Fires Increase risk of Heat stroke/dehydration	County wide Beaches Tourist Locations	Severe Weather Plan	3	Service Provision under pressure at community Level. Small number of Injuries Increased call out number	Ambulance service Civil Defence

3.4 Adaptation in Action

Case Study 1- Arthurstown Flood Scheme 2016

This Flood relief Scheme was designed to ensure that flooding on the scale experienced in February 2014 is not repeated and to provide protection against 1 in 200 year return period coastal flooding events.

Arthurstown Flooded in February 2014

- 29 properties flooded
- 1 business flooded



Arthurstown, road to pier - 3rd February 2014

The scheme involved the upgrade approximately of 480m of existing seawall defence. The height of the rehabilitated walls vary between 3.5 – 4.25mOD and will therefore cater for an event similar to that experienced in February 2014 where flood waters were recorded at heights greater than 3.0m.

The works included:

- 1) Raising of existing seawall using masonry.
- 2) Demolition and subsequent reconstruction of sections of existing seawall using a combination of reinforced concrete and masonry cladding.
- 3) Construction of reinforced concrete capping on top of sections of existing seawall.
- 4) Installation of proprietary demountable flood barriers.
- 5) Installation of non-return valves.
- 6) Construction of a new foul pumping station complete with all pumps, valves, pipework etc.
- 7) Construction of a new surface water pumping station complete with all pumps, valves, pipework etc.

Works commenced on site on the 4 July 2016.

The Certificate of Substantial Completion issued on the 15th of March 2017.

The Outturn Cost excl. VAT was €692,500.00



Scheme Extents



Arthurstown – Storm tides 16/10/17 (new flood wall during storm tides)



Arthurstown – Storm tides on the 16/10/17 (new demountable barrier during storm tides)

Case Study 2 Donaghmore Coastal Protection Works

Issue

Donaghmore is located approximately halfway between Roney Point to the north and Glascarrig Point to the south on the east coast of County Wexford. The section of the access road that runs parallel to the soft sandy cliff is 300 metres long and there are a number of residential properties on the seaward and landward side of the access road; a cemetery is located on the landward side of the road.



The sandy cliffs suffered severe erosion with material falling from the front face of it during winter storms of 2016, particularly from Storm Imogen on 8th February. The erosion caused three residential properties to be irreparably damaged with a potential erosion threat to the cemetery and public road.

Brief summary of works

- Full demolition and disposal of 3 damaged properties on seaward side of road. This was required to ensure safe working area at the base of the cliff.
- Construction of 110 metres of rock armour coastal protection to protect public road and cemetery from further threat of erosion.

Costs

- €300,000 including VAT. Includes design and construction costs.



Case Study 3 Enniscorthy Flooding Winter 2015/2016 and Flood Defence Scheme

Flood Event - December 29th 2015 to January 10th 2016

Extremely wet conditions were experienced throughout the country during December 2015. Met Eireann reported that most of its weather stations had between double and triple normal rainfall amounts for the month. Johnstown Castle Weather station had 267mm (10.5 inches) of rain during the month which is 246% of the long term average for the station. During the six day period prior to the flooding event nearly 100mm (4 inches) of rain fell at both Johnstown Castle and Oakpark.

Wexford County Council's flood plan forms part of the Wexford County Council's Major Emergency Plan and covers advanced Preparation, Pre-Flood actions, Flood awareness, Traffic Management, Communications, On-site co-ordination, welfare, Health and Safety, Demobilisation and assigns responsibilities, functions and responsible persons..

The plan also includes for on-site monitoring of the River Slaney water levels and liaising with Carlow County Council on river levels at in their local Authority area.

The Office of Public Works web site waterlevel.ie records river levels on many rivers throughout the country including the river Slaney. River levels are recorded each quarter of an hour and the site is updated within minutes. Levels are graphed to local datum and Ordnance Survey Poolbeg datum.

The water levels rose rapidly from 2.85m @ 11pm on Tuesday 29/12/15 to 4.46m at 12:30pm on Wednesday 30/12/15 a rise of 1.61m (5 feet 3.4 inches) in less than 14 hours.



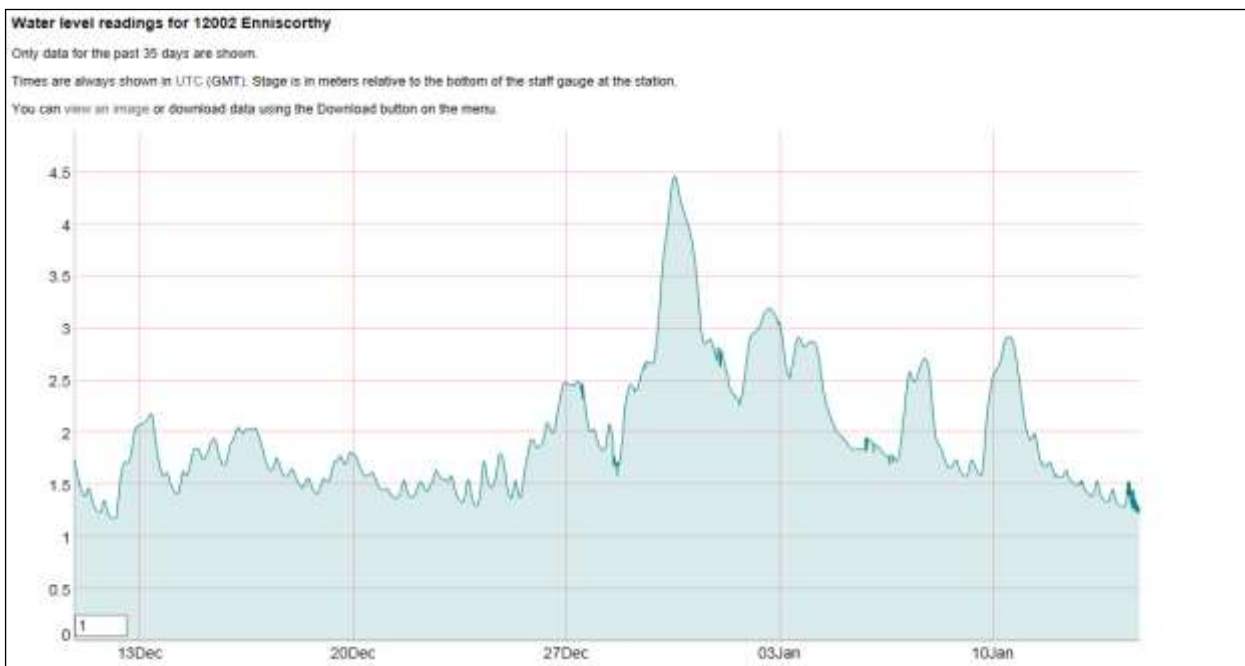


Figure 1 : River levels from 11/12/15 to 15/01/16 AT Old Bridge Enniscorthy

On the evening of Monday 28/12/15 the Slaney river in Enniscorthy started to rise. On the morning of the 29th the river had hit the warning level of 2.4m. The water levels continued to increase and rose rapidly from 2.85m @ 11pm on Tuesday 29/12/15 to 4.46m at 12:30pm on Wednesday 30/12/15 a rise of 1.61m (5 feet 3.4 inches) in less than 14 hours.

The significant rise in the water levels resulted in extensive flooding of the Enniscorthy Quays and surrounding areas. Extensive damage was caused to road network, bridges and culverts. Road diversion were put in place. Over 5000 sand banks were available to affected areas with 4750 used during the event. The main N11 national road through the town was flooded and there was flooding at Bunclody, Clohamon, Edermine, Clonhastin and The 'Still Pond'. Crews from other council road areas were deployed to assist road diversion and signage. The Slaney Search and River Rescue was mobilised to assist residents in some of the flooded areas.

Diversion routes were updated to the Press. Communication with the public was via South East Radio and the Gardaí informed AA Roadwatch of diversion in place and updates. Wexford County Council's Web site, Mapalarter and Twitter were also updated with information as it arose. The fire service were called to assist premises at Island Road. The Civil Defence and Army also provided assistance.



Fire Service in attendance at Island Road (12:33pm)



River Rescue Service ferrying persons at Templeshannon (12:09 pm)



River level still rising at Seamus Rafter Bridge (11:25am)



Abbey Quay Flooding (11:27am)



Shannon Quay Flooding (12:07pm)

The water levels in the river began dropping on 30th December and the national N80 and N11 roads were reopened and the clean-up operation began.

Flooding of the N11 on Abbey Quay and Shannon Quay re-occurred on Saturday 2nd January from 12 noon to 1am on Sunday morning 3rd January 2016.

Flooding continued on The Prom until Sunday 2nd January 2016 and reoccurred on Saturday/Sunday 9th/10th January 2016.

147 properties flooded in total

82 private dwellings and

65 commercial properties/premises either flooded or inaccessible

2,094 lin. m (2.1km) of roadway where flooded at the peak of the flood around the town.

National primary roads (943 lin. M)

Regional roads (97 lin. M)

Local roads (1,054 lin. M) plus car parking area at the Swimming Pool and Abbey Quay Shopping centre.

90 response personnel were deployed to the flooded areas.

This comprised of 50 road crew including crews from Enniscorthy, Wexford, Gorey and New Ross District, were deployed on rotation of shifts throughout day and night. Other staff included

Outdoor Staff from Town – Foreman and 5 crew,

Area Engineers - 2 persons,

Management and Indoor Staff – Enniscorthy Market Square Office 5 persons,

County hall – 5 persons

Gateway Staff – Forman and 8 crew

Fire Service – 14 crew + 2xRSFO

4,750 sand bags used

700 additional sand bags used when further flooding of Abbey Quay and Shannon Quay occurred on 2nd January of N11 Abbey Quay and Shannon Quay

79 personnel from Outside Organisations (Garda Síochána , HSE, Civil defence, Army Slaney search and rescue, Contractors

The response was acknowledged by a visit by President Michael D.Higgins to Enniscorthy town on 4th January 2016 which recognized the commitment and dedication of Wexford County Council,

the emergency service and volunteers who responded to the extreme flooding event over several days.



Costs associated with Extreme Weather Event November 2015 to January 2016

District	Cost
Clean up Operations	€217,000
Loss of Rates	€140,942
Enniscorthy	€427,000
Gorey	€303,000
New Ross	€1,199,500
Wexford	€520,500
Total Cost	€2,807,942

Enniscorthy Flood Defence Scheme

The Office of Public Works (OPW), in conjunction with Wexford County Council, undertook a study of the flooding problem in Enniscorthy and a design for a flood defence scheme was proposed. The Flood Defence Scheme combines a number of measures to prevent flooding in the town. These include river channel

widening, river deepening, bridge relocation, and the construction of extensive glass paneled flood walls through the town.

The proposed construction works will cover a 3.5km stretch of the River Slaney, extending from 1.5km upstream of Enniscorthy Bridge to 2km downstream. The main elements of the project include:

- Construction of flood defence walls on both banks, upstream of Enniscorthy Bridge, through the town, finishing just south of the Promenade.
- River channel widening and deepening
- In partnership with Irish Rail improving the hydraulic capacity at the railway bridge.
- Deepening of the riverbed beneath the Old Enniscorthy Bridge.
- Construction of a new road bridge over the River Slaney and railway line, located to the south of Enniscorthy.
- Removal of the existing Seamus Rafter Bridge.
- Construction of a new pedestrian bridge in the town centre.

Scheme costs are estimated at between €40M and €45M.

Case Study 4 Interreg Eco-structure Project In Wexford

ECOSTRUCTURE is part-funded by the European Regional Development Fund (ERDF) through the Ireland Wales Cooperation Programme 2014-2020.

Eco structure will raise awareness of eco-engineering solutions to the challenge of coastal adaptation to climate change. Eco structure aims to promote the incorporation of secondary ecological and societal benefits into coastal defence and renewable energy structures, with benefits to the environment, to coastal communities and to the blue and green sectors of the Irish and Welsh economies. Eco structure is an operation to be delivered directly by an interdisciplinary partnership bringing together expert staff from five leading research-intensive universities in Wales and Ireland.

Research has shown that it is possible to promote biodiversity on artificial coastal structures through engineering design interventions, with potential for achieving associated socio-economic benefits – this is called *ecological engineering* (or *eco-engineering*). Although a wealth of ‘proof-of-concept’ evidence exists globally, eco-engineering designs have rarely been implemented in full-

scale developments and many questions remain about their potential value and scope of application.

UCD with the support of Wexford County Council currently have eco-engineering studies running in various locations in Wexford, consisting of a mix of some grooved tiles and artificial rock pools (vertipools) as well as pits, grooves and crevices drilled into rock armour structures. The aim of these engineering solutions is to add space for nature into artificial structures, essentially create water-retaining spaces as a refuge for animals and plants once the tide goes out. The pools are located in Duncannon harbour, Wexford harbour, Slade Harbour and Kilmore Quay. Kilmore Quay is a two pronged study in that it has experimental vertipools near the fishing pier and also a pool/tile/pits/crevices/grooves array as part of a public perception study. This perception study will gather information from the general public and users of the harbour to gauge how people feel about them and do they add to our environment. Alongside this eco engineering studies, UCD have another team working on scanning artificial structures and natural shores around Wexford, looking to mirror natural shore topography and complexity in any future engineering solutions



Case Study 5 Community resilience in Action

A unique guide designed to help individuals and community groups prepare for, respond to and recover from emergencies in their local areas was launched in February 2019.

Preparing for the Unexpected is a written guide to help communities prepare for emergencies such as severe weather events. The guide will not replace the emergency services – rather it will support people and their families, helping in making sensible preparations now to be more self-sufficient during an emergency.

Wexford's emergency services, including Wexford County Council, An Garda Síochána, the HSE and Civil Defence will always respond to significant emergency events. However, the management of more severe emergencies, such as experienced during Storm Ophelia and Storm Emma, will require a whole of community response. Community groups can facilitate this effort by supporting community preparedness and encouraging households to have a plan to deal with such emergencies and to recognise that simple activities and preparations can make a big difference.

Preparing for the Unexpected is a joint initiative of Wexford Emergency Services, including Wexford County Council, the HSE, an Garda Síochána, National Ambulance Service, Order of Malta, Red Cross, Wexford Civil Defence and Wexford PPN (Public Participation Network) in partnership with Wexford GAA, Wexford IFA, Society of Vincent De Paul, Muintir na Tíre, Wexford Marine Watch and Meals on Wheels. The document is based around the concept of enabling well-established clubs and groups to work with their members and wider community to prepare effectively for emergency weather events that may occur in their locality.

In addition to helping their local community prepare for such emergencies, these groups and clubs have also agreed to assist the Emergency Services during the response to the event by assisting in the provision of emergency food, water or heating supplies, transport, basic medical assistance, or simply some help to those affected by the emergency event.

The "Preparing for the Unexpected" one-page guide was delivered to every home and business in County Wexford. It was recommended that all households read the document carefully, note the contents, make the recommended preparations and store the useful guide in a safe place for reference during any period of sustained severe weather.



Case Study 6 New Ross Flood Defence System

The quays at New Ross and lower lying parts of Rosbercon have always been subject to tidal flooding. In 2009 Wexford County Council undertook an interim flood scheme protecting 500m on the eastern quays adjacent to the town centre. This proved effective at protecting the town centre from storm tides to date, some of which reached within 75mm of the top of the flood wall.

The 2014 storm tides saw New Ross flooded at both sides of the interim scheme leaving the town impassable and many businesses and homes flooded. This was the impetus for the design and construction of a flood scheme that would protect the majority of the town from a 1 in 200 year return flood.

Construction started in January 2017 and was completed in April 2018. The works included: glass panels, stone faced flood walls, raising earthen embankments, demountable barriers and drainage works. The flood scheme is 2,200m long and protects 416 residential units and 136 retail premises.



Flooding at New Ross Quays (February 2002)



Newly constructed Glass Panels at the Quays in New Ross



Newly constructed Stone Faced Walls at Rosbercon in New Ross



New Ross Flood Scheme - Flood protection area

Chapter 4 Risk Identification

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

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

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

A summary of projected climate impacts for Ireland is outlined in the table below.

Parameter	Observed	Projected	Example of Biophysical Impacts
Temperature	<p>Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade.</p> <p>The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.</p>	<p>Projections indicate an increase in average temperatures across all seasons (0.9-1.7°C).</p> <p>The number of warm days is expected to increase and heat waves are expected to occur more frequently.</p>	<p>Incidences of cold stress are likely to decrease while incidences of heat stress will increase.</p> <p>The duration of the growing season will increase, occurring earlier and extending farther.</p>
Precipitation	<p>Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30year period 1961-1990.</p> <p>The largest increases are observed over the west of the country.</p>	<p>Significant reductions are expected in average levels of annual, spring and summer rainfall.</p> <p>Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%).</p>	<p>The increased occurrence of dry spells will result in increased pressure on water supply.</p> <p>An increase in the frequency of extreme precipitation events will result in increased fluvial and pluvial flood risk.</p>
Wind speed and storms	<p>No long-term change in average wind speed or direction can be determined with confidence.</p> <p>The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950.</p> <p>Increases in extreme wind speeds may impact on wind turbines and the continuity of power supply.</p>	<p>Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter.</p> <p>The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.</p>	<p>Infrastructure will be at risk due to the increased occurrence of intense storms (e.g. winter 2013/2014).</p>
Sea Level and Sea Surface Temperature	<p>Historically, sea level has not been measured with the necessary accuracy to determine sea level changes around Ireland. However, measurements from Newlyn, in southwest England, show a sea level rise of 1.7cm per decade since 1916. These measurements are considered to be representative of the situation to the South of Ireland</p> <p>Sea Surface Temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish coastal records.</p>	<p>Sea Levels will continue to rise for all coastal areas, by up to 0.8m by 2100. The south of Ireland will likely feel these rises first.</p> <p>Sea surface temperatures are projected to continue warming for the coming decade. For the Irish Sea, projections indicate a warming of 1.9 °C, by the end of the century.</p>	<p>Significant increase in areas at risk of coastal inundation and erosion.</p> <p>Increased risk to coastal aquifers and water supply</p> <p>Implications for fisheries and aquaculture industries</p>

Table 4.1 Summary of projected climate impacts for Ireland (Source: National Adaptation Framework, 2018)

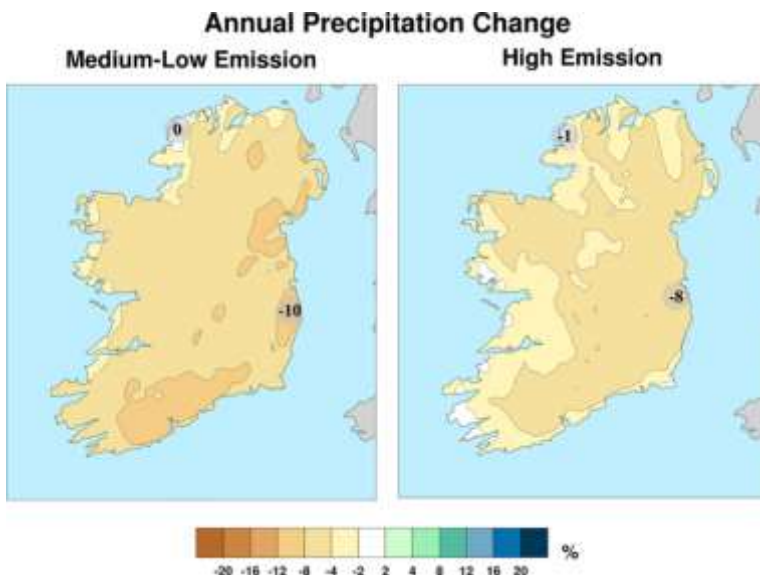
4.2 Climate Projections

4.2.1 Temperature

According to Met Eireann, projections for the period 2041-2060 indicate an increase of 1–1.6°C in mean annual temperatures, with the largest increases seen in the east of the country. Warming is enhanced for the extremes (i.e. hot or cold days), with highest daytime temperatures projected to rise by 0.7–2.6°C in summer and lowest night-time temperatures to rise by 1.1–3°C in winter. Averaged over the whole country, the number of frost days (days when the minimum temperature is less than 0°C) is projected to decrease by 50% for the medium-low emission scenario and 62% for the high-emission scenario. The projections indicate an average increase in the length of the growing season by mid-century of 35 and 40 days per year for the medium-low emission and high-emission scenarios, respectively. Milder winters will, on average, reduce the cold related mortality rates among the elderly and frail but this may be offset by increases due to heat stress in the warmer summers .

4.2.2 Precipitation

According to Met Eireann, the down-scaled simulations show significant projected decreases in mean annual, spring and summer precipitation amounts by mid-century. The projected decreases for the period 2041 -2060 are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. The frequencies of heavy precipitation events show notable increases of approximately 20% during the winter and autumn months. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer. The projected increases in dry periods are largest for summer, with values ranging from 12% to 40% for both emission scenarios.



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

Figure 4.1 Annual Precipitation Change

4.2.3 Wind Energy and Storms

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

4.2.4 Sea Level Rise

Globally sea levels have been rising at an average rate of approximately 3 mm per year between 1980 and 2010. Sea level is projected to continue to rise at this rate or greater. All major cities in Ireland are in coastal locations subject to tides, any significant rise in sea levels will have major economic, social and environmental impacts. Rising sea levels around Ireland would result in increased coastal erosion, flooding and damage to property and infrastructure.

4.2.4 Nature

Changes in the climate will bring changes in the behaviour of species. A spring warming in recent years has seen an advance in the timing of key phenological phases of a wide range of organisms, including trees, birds and insects. For example, higher temperatures in late winter or early spring results in butterflies appearing earlier in the year and birds shifting their migration patterns. The pace of future change will cause stress to ecosystems which are unable to adapt quickly.

It has been observed in Valentia. Co. Kerry for the tree species is Birch (*Betula pubescens*) that the beginning of the growing season is occurring approximately 10 days earlier now than when compared to the early 1970s which has resulted in an extension of the growing season. Projected changes in temperature are expected to result in a lengthening of the growing season with spring occurring earlier. This is particularly the case for the northeast of the country where the timing of birch bud burst is expected to occur 10 days earlier in the 2080s than when compared to the 1990s²

4.3 Future Climate Risks to Local Authority Identified – Climate Risk Register

Future Climate risk to Wexford County Council have been summarised below in Table 4.2. This Table describes the climate hazard, the area(s) of Wexford County Council which could be impacted by the climate hazard with a corresponding risk statement.

Table 4.2 Impacts of Climate Change: Risk Register for Wexford

Climatic Hazard	Impact area	Risk Statement
 All Weather events	LA Assets	More frequent and intense extreme events i.e. rainfall, wind and snow events will damage local authority buildings, housing stock, equipment and facilities (machinery yards, storage facilities etc) giving rise to increased costs for maintenance, repair and replacement and increased demand on staff resources .
 All Weather events	Business Operations & Continuity	More frequent and intense extreme events will see more closures impacting the local authority in performing normal daily tasks, exercising statutory duties and organising events . This will interrupt work flows and efficiencies, disrupt scheduled events and increase staff costs in dealing with extreme events.
 All Weather events	Business Operations & Continuity	Increased frequency of flooding and inundation, storm and extreme cold events (snow) will give rise to general service disruption presenting difficulties for business continuity and the delivery of projects locally, as a consequence of staff being unable to travel to work.
 Storms	Business Operations & Continuity	Projected increases in storm intensity will see a higher risk of service disruption due to closure of local authority buildings, damage to LA communications infrastructure, impact on road networks from debris and impact on utility networks e.g. Electricity supply, directly impacting Local Authority's ability to operate.



Heavy Rainfall

Critical Infrastructure

Flood/ Water Management

Extreme rainfall events could affect **critical infrastructure** such as roads, water, sewerage, storm water, housing and communications through flooding and inundation. Damage to critical infrastructure will **impact the economic function of transport routes, will give rise to flooding impacts to properties and communities** resulting in **increased costs of clean up and maintenance, repair and insurance costs and a wider economic impact.**



Heavy Rainfall

Environment, Bio-diversity

Extreme rainfall events will give rise to flooding of habitats and wash nutrients and sediment into watercourses. This will result in **changes to geomorphology** and cause **contamination of watercourses.** Landscape may become more vulnerable, ecologically sensitive and may result in habitat loss.



Extreme Heat/drought conditions

Environment, Bio-diversity

Heatwaves and/or sustained drought conditions will result in significant and serious **degradation of the natural environment and biodiversity** with loss to/of important species/habitats, impact on important landscapes and reduction in water quality.



Extreme Heat/drought conditions

Community

Higher temperatures and more hot days could result in heat exhaustion and **increased heat-related stress with vulnerable people within communities increasing the need for emergency response.** Remote communities are particularly vulnerable.



All Weather events

Infrastructure
Structural,
community, cultural

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



Extreme
Heat/drought
conditions

Emergency services
Environment

Higher temperatures and longer dry seasons will increase **risk of bog, sand dune, gorse or forest fires** in some areas, will impact on the integrity of road composition in these areas and water supply in such areas. This will impact on resources of the fire services, result in road closures, threat to public safety and potential local economic impact through loss of tourism potential.



Biodiversity/
Environment

Infrastructure



Storm Surges/Sea
Level Rise

Roads, Water
Services,
Community

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



Storm Surges/Sea

Emergency Services,
Environment,
Community

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

Level Rise



All Weather events

Infrastructure
Structural,
community,
Heritage

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



Heavy Rainfall



Extreme
Heat/drought
conditions

Bio-diversity
Environment

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



Heavy Rainfall

Environment
Bio-diversity

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



Water Services

**Extreme
Heat/drought
conditions**



**All Weather
events**

All Services

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

Chapter 5 Mitigation in Wexford County Council

5.1 Introduction

It is not possible to develop a Climate Action Adaptation Strategy without discussing measures pertaining to climate mitigation. Mitigation is defined as the efforts made to reduce the severity of future climate change impacts by reducing the emission of greenhouse gases.

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

5.2 Mitigation Baseline

5.2.1 Wexford County Council's Energy Use & Emissions

Wexford County Council is responsible for the energy use and emissions from its buildings and facilities, its public lighting, and from its vehicle fleet. The information from the Sustainable Energy Authority of Ireland's (SEAI) Monitoring and Reporting (M&R) database shows that WCC consumed a total of 34 gigawatt hours (GWh) of primary energy in 2017 and 70 gigawatt hours (GWH) in 2009 which is the baseline year for M&R.

M&R measure energy performance based on activity metrics. WCC has improved its energy performance by 26.2% between the baseline year 2009 and 2017 based on the selected activity metrics for each fuel type.

This highlights a gap-to-target of 6.8%, meaning that WCC must improve its energy performance by a further 6.8% between now and 2020 in order to meet its 33% energy reduction target.

Wexford County Councils highest energy consumer is Public Lighting, accounting for 39.7% 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 were the second highest energy consumer, accounting for 29% of the total energy consumption, while the municipal fleet accounted for 15% of the total energy use. This is shown in Figure 5.1.

SIGNIFICANT ENERGY USERS (TPER kWh)

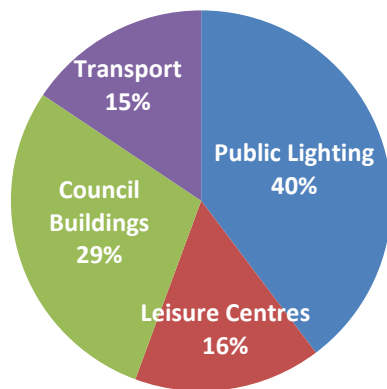


Figure 5.1 Wexford County Council – Significant Energy Users

5.2.2 County Wexford Energy Use & Emissions

The most accurate information for total emissions in Wexford County is based on Census 2006 data and is shown in Figure 5.2. Using this data, WCC was able to calculate that the total emissions for County Wexford amounted to 1,882,699 Tonnes of CO₂ equivalent in 2006. The sectors that produced the most emissions were the agricultural, transport and residential sectors, accounting for 43%, 22%, and 18% of the total emissions, respectively. The public sector accounted for 2% of the county’s total CO₂ emissions. This emphasises the importance of collaboration and action from all stakeholders to tackle the remaining 98% of emissions from the private sector in County Wexford.

WEXFORD COUNTY 2006 CO₂ EMISSIONS

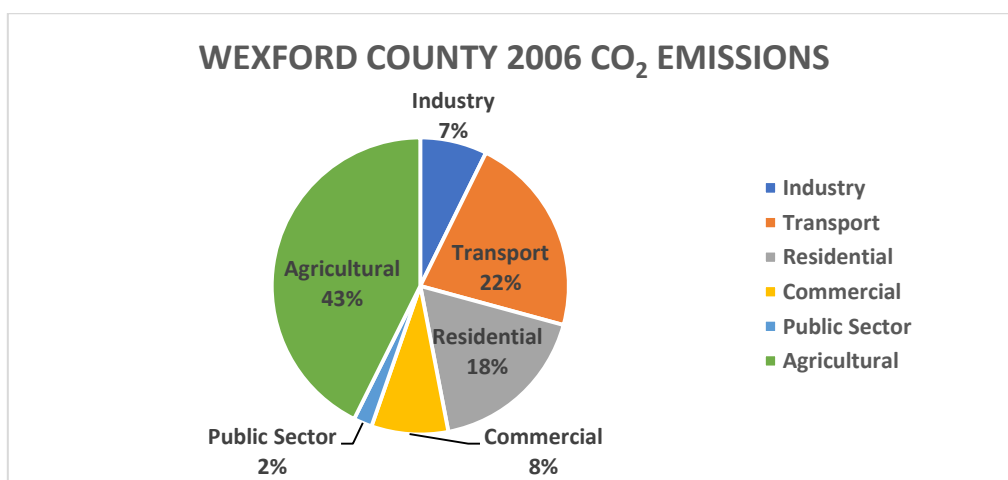


Figure 5.2 Wexford County Council – 2006 CO₂ Emissions

To calculate County Wexford's total final consumption and CO₂ emissions for the COM 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. County Wexford had a total of 27,818 BERs publishable for use in this SEAP. The energy performance is expressed as: (a) Primary energy use per unit floor area per year (kWh/m²/yr) represented on an A to G scale; and (b) Associated Carbon Dioxide (CO₂) emissions in kgCO₂/m²/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 CO₂ Emissions, was measured from 2009-2013 SEAI Energy MAP reporting of Wexford's public sector and was compared to the national public sector obtained from SEAI

Transport

The national primary energy and CO₂ 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 Wexford's primary energy consumption and CO₂ emission was based on the average percentage of vehicles of different categories in Wexford and the State, obtained from the CSO Census 2006.

Commercial and Industrial

The methodology used in calculating the baseline energy and corresponding CO₂ 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 CO₂ emissions. The area of farmland in Wexford 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 Wexford’s primary energy consumption in the agriculture sector, by multiplying it by the national primary energy consumption figure for agriculture, obtained from the SEAI.

5.2.3 Wexford County Council’s – Electricity Usage (M&R)

In 2017, public lighting consumed 66.3% of the council’s total electricity usage. The remaining 33.7% 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.

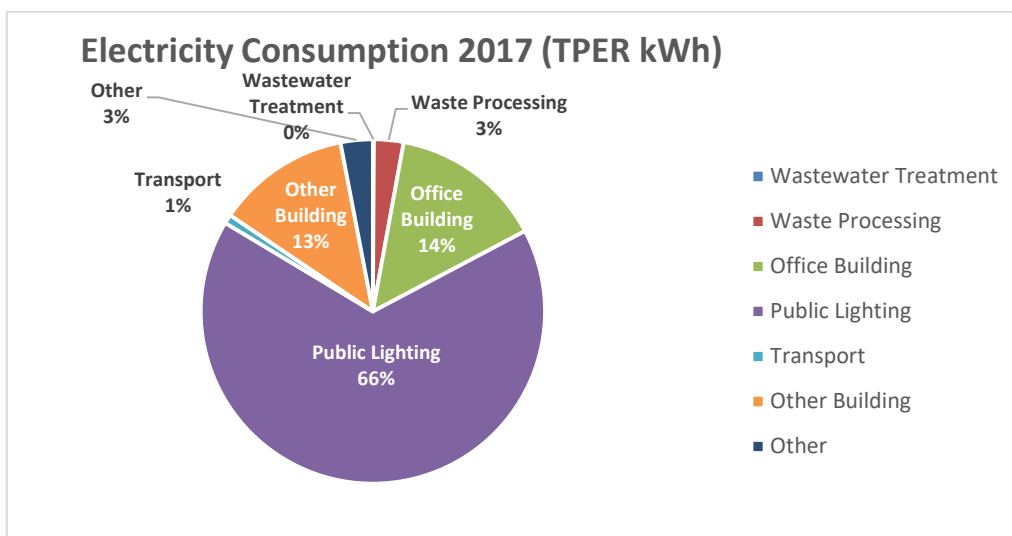


Figure 5.3 Wexford County Council – Electricity Consumption 2017

In 2017, Wexford County Council produced 7,021 tonnes of CO₂, most of the CO₂ emissions for the council’s operations were associated with electricity usage at 66%, and the councils transport section was the second highest at 18% with the remaining thermal use associated with the heating of council buildings.

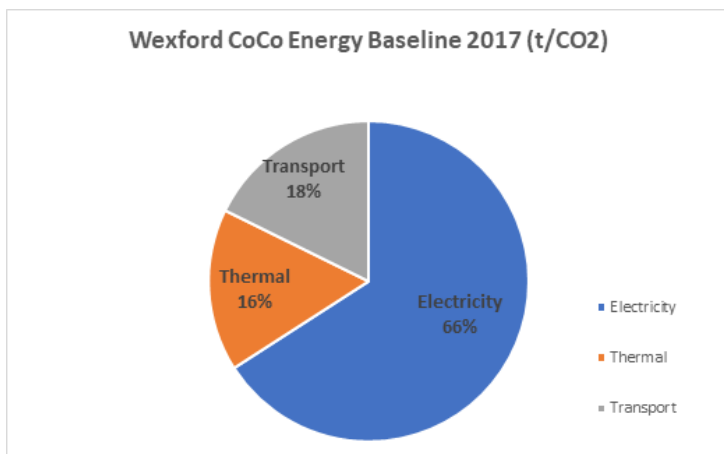


Figure 5.3 Wexford County Council – Breakdown CO₂ Emissions

Overview

34 GWh
Consumed in 2017 = 7,020
Tonnes of CO₂



Target



33%
Improvement
in energy
efficiency by
2020

40%
Reduction in
Council's
GHG
emissions by
2030

Examples of main action types

Energy Master Plan for the Wexford Region



Public lighting upgrades

Energy upgrades in Council buildings



Social Housing Retrofits

Home Energy Saving Kits in all WCC libraries



Research and Innovation

Stakeholders to work with and

Private Businesses

SEAI/DCCA

Private Citizens/Communities

Energy Suppliers

Government Departments (DCCA)

Developers



5.3 Energy & Buildings

In 2017, Wexford County Council's buildings and public lighting accounts consumed 22GWh of primary energy, which amounted to 7,021 tonnes of CO₂. 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, WCC will reduce the emissions from its operations and service delivery. As WCC is not responsible for the upgrading of private buildings in Wexford, it will provide information on how WCC has retrofitted social housing and council-owned building stock, and how it has deployed renewable energy systems.

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

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

- To reduce energy related CO₂ emissions of Wexford County Council;
- To demonstrate 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 Wexford 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 improve 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 Wexford County Council's Adaptation Plan.

5.3.1 Wexford County Council Monitoring & Reporting

Under S.I. No. 426 of 2014, the Wexford County Council have an obligation to report annually on their energy performance. The Public Sector in Ireland is tasked with reducing their energy consumption by 33% by 2020 from their baseline year. The baseline year for Wexford County Council is 2009. Wexford County Council reports their energy usage annually to the Sustainable Energy Authority of Ireland (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, Wexford County Council is currently at 73.82% relative to 2009 as per Figure 5.4, or there has been a 26.2% reduction in energy consumption. As a result of this the council 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% toward the target and it is envisaged that further developments towards energy efficient

street lighting projects, such as the pilot project developed in Wexford will help the group to achieve their targets.

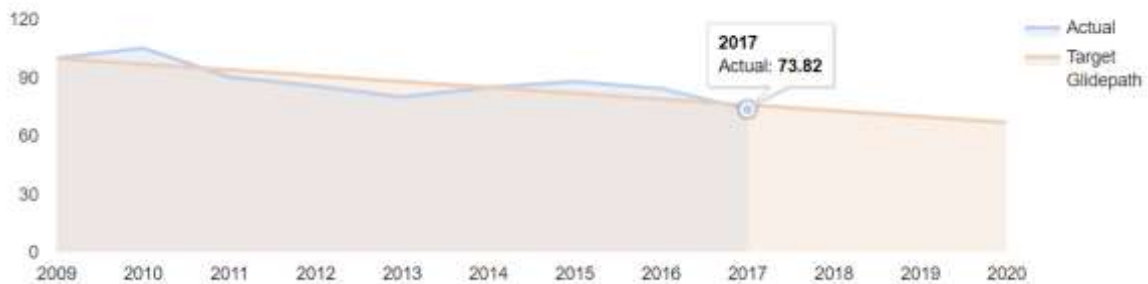


Figure 5.4 Wexford County Council’s 2017 Monitoring & Reporting Results

For Wexford 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 Wexford 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. Wexford County Council will revise the energy efficiency investment strategy in 2019 to develop these projects further.

Case Study – WCC Case Study 1

Wexford County council operates and maintains public lighting throughout the county.

In 2016, Wexford County Council embarked on a Retrofit Programme to replace all existing lamps with LEDs as many of the existing stock is old and needs replacing.

In 2017, there was approx. 14,115 public lamps, of which 692 were LEDs. The remaining lamps were a mixture of SON, SOX, and metal halide lamps. The annual energy cost was €930,000 and maintenance costs were €400,000.

The existing 70W Son are replaced with 25W LED, 135W SOX and 150W SON replaced with 84W LED. There is also dimming and trimming involved.

The retrofit programme is to be completed in 2021. The programme will achieve energy savings of 1,238,282kWh which is up to 65% of current energy use. The total project cost will be in the region of €5,500,000. The annual cost savings in energy and maintenance will be in the region of €850,000.

The energy savings achieved through the programme will contribute towards the council 2020 targets of 33%.



BEFORE



AFTER

Lamp Type	No.	Billable Wattage	Total Wattage	kW per year @ 4,150 hrs per year
250W SON	277	275	76,175	316,126
150W SON	1,121	170	190,570	790,866
135W SOX	258	165	42,570	176,666
70W SON	1,763	85	149,855	621,898
	3,419		459,170	1,905,556

Figure 4: Existing Public Lighting Lamps

Replacement Lantern	No.	Billable Wattage	Total wattage	KW per year @ 4,150 hrs per year	Total KW after dimming and Trimming Adjustment
120W LED	277	120	33,240	137,946	120,703
84W LED	1,121	84	94,164	390,781	341,933
84W LED	258	84	21,672	89,939	67,454
25W LED	1,763	25	44,075	182,911	137,183
	3,419		193,151	801,577	667,273

Figure 5: Existing Public Lighting Lamps

The energy savings once the project is complete will be 1,238,283kWh per annum.



BEFORE



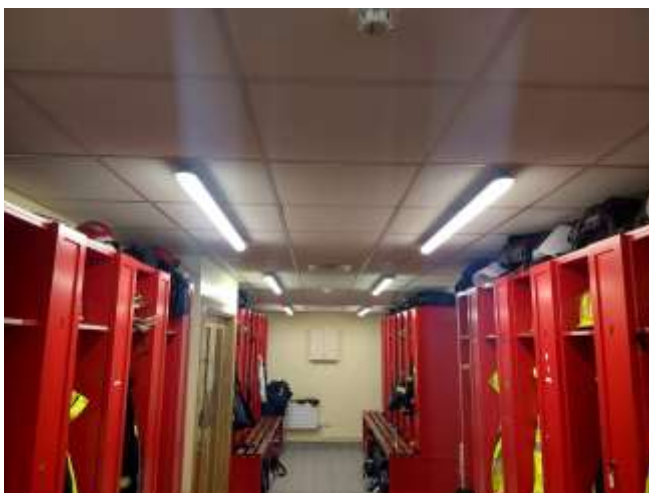
AFTER

Case Study – WCC Case Study 2

In 2018, an LED lighting retrofit upgrade was completed at Wexford Fire Station HQ. The project was funded by Better Energy Communities (BEC) 2018 programme to reduce electricity and heating demand at the facility.

The project saw the replacement of 100 x 72W 600x600 recessed lamps, 20 x 100W Fluorescent Tubes, 26 x 60W circular light fittings, 2 x 100W outside lamps, 7 x 120W pole top lamps and 2 x 250W flood lamps with LED equivalent.

The total project cost €11,363 with grant aid from SEAI worth €3,409 assisting in the retrofit. Savings over a 25-year period are estimated to be €26,418, reducing the cost spent annually on electricity while resulting in a warmer and more comfortable fire station.



	Annual Energy Consumption	Annual Cost Consumption	Annual CO₂
Imports before project	62,928kWh	€3,746.10	19.5 Tonnes
Imports after project	56,712kWh	€2,522.10	16.9 Tonnes
Savings	6,216kWh	€1,224.00	2.6 Tonnes

5.4 Nearly Zero Energy Building (nZEB) and Passive Housing Projects

Wexford County Council are actively involved in promoting energy efficient housing in both new and existing housing stock and are considered one of the leading Authorities in Ireland in the passive housing building area. There are a number of capital projects and retrofit schemes underway and a number have also been successfully completed to date. 100% of Wexford County Council new-build houses have been delivered to nZEB standard since Q1 2018. The construction of all new houses to nZEB standards and the retrofit of older housing stock to A energy ratings is significant in mitigating against Climate change. Incentives are provided through the planning process to those who utilise mechanisms to promote the use of green energy in all buildings. Deduction of between 10% to 50% is applied to developments that encourage renewable energy and energy conservation. Provisional BER Certificates are submitted as part of the planning application to avail of the discount. It is necessary for energy conservation to be given consideration in the design process in order to maximise energy use. The deductions applied in the planning permission as follows;

50% reduction for 0 % energy use and NZEB (Nearly Zero Energy Buildings)

30 % reduction for A1

20 % reduction for A2

10 % reduction for A3



New development of nZEB houses for sale in Gorey, County Wexford

5.4.1 Capital Projects

Housing 4.0 Pilot Scheme

The Wexford Co. Co. Capital Housing Design Team are constructing 4 no. new-build apartment units as part of a joint initiative pilot scheme, Housing 4.0, with the 3CEA (3 counties energy initiative). The 4 no. apartment units, located at Creagh Roundabout, Gorey, are being constructed with the objective of achieving a 60% lower carbon footprint and 25% reduced construction costs (compared with average new-build houses by lowering the embodied and operational energy). The aim of the project is to develop a market for small, affordable near-zero energy homes using new technology. The operational energy output of the units will be monitored afterwards for a period of 10 years.

This pilot project will be a case study when completed in 2021

Monitoring of Passive Housing Developments

Wexford County Council purchased 8 no. turn-key timber-frame houses that have been constructed to passive house standard at Madeira Oaks, The Moyne, Enniscorthy.

Dr. Shane Colclough, researcher at the Centre for Sustainable Technology in Ulster University and PHAI director, recently released a report based on the monitoring of one of the dwellings. The monitoring activity registered the values of primary energy consumption, carbon dioxide emissions, Energy Performance Coefficient (EPC), Carbon Performance Coefficient (CPC), revealing that while the house is designed to meet the Passive House standard, it is also able to achieve nZEB.

Space heating, domestic hot water, ventilation and cooling needs are addressed by an exhaust air heat pump and a heat recovery unit. The house uses only electricity as its energy source (which could be from renewable sources).

10. no houses at Shanna Court, Wexford. These houses have been built to the 2011 Part L TGD Standards. They were the first houses to have heat-pumps installed and achieved a high standard of airtightness. These are currently being monitored by Dr. Shane Colclough.

2018

The number of new build near zero energy building units completed in 2018 by the capital housing team was 21.

57 turn-key units built to passive housing standards were also completed in this period.

2019

The construction of 39 nZEB units is underway in 2019.

5.4.2 Retrofit Projects

The operations section of Housing has been involved in a number of housing upgrades/retrofits to improve energy efficient and insulation in the existing Housing Stock. In 2017 and 2018 deep retrofits were completed at 2 separate developments comprising 24 units. External Insulation and

heating upgrades were also carried out on existing housing stock to improve energy efficient and reduce carbon footprint.

The statistics from 2014 to 2018 is as follows

Year	2014	2015	2016	2017	2018
External Insulation	20	25	36	26	36
Heating Upgrades		25			
Deep retrofit				12	12

Case Study 1 Upgrade of External Insulation and Windows and Doors in existing housing



Before



Insulation in Progress

External Insulation and the replacement of windows and Doors with



After

Case Study 2 Deep retrofit at College View Wexford

PRE-WORKS-COLLEGE VIEW WEXFORD

- 12 units constructed early 70's
- 6 end terrace
- 6 mid terrace
- BER's of G'S & F'S
- Air Tightness = 7-9 m³/h/m²
- Lack of Ventilation

Before Retrofit



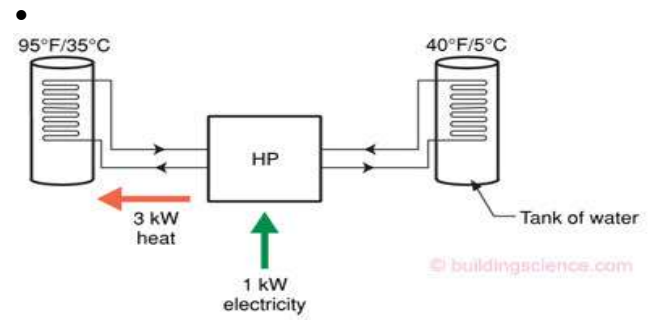
After Deep Retrofit



Measures:

External Insulation

- Attic Insulation
- Heat Pump
- PV Solar power
- Demand controlled ventilation
- Windows and Doors



External Insulation:

- Existing Wall U-value = 1.8 W/m²K
- 100MM Insulation
- Improved U-value = 0.20W/M²k
- Cost per Unit = €5,000.00

Attic Insulation:

- Existing Ceiling Insulation U-Value = 0.16 W/m²K
- 400MM Insulation
- Improved Ceiling Insulation U-Value = 0.12W/M²k
- Cost per Unit = €800.00

Heat Pump:

- 4kW Daikin Air to water
- Space heat Efficiency of 530%
- Water Heat Efficiency of 213%
- Radiator emitters
- Fully Integrated Controls
- Room Thermostat
- Cost per unit = €7,000.00

PV Solar:

- 6 NO 285W Panels
- SE/SW 38 Degree tilt
- Cost per Unit = €5,000.00

Windows & Doors:

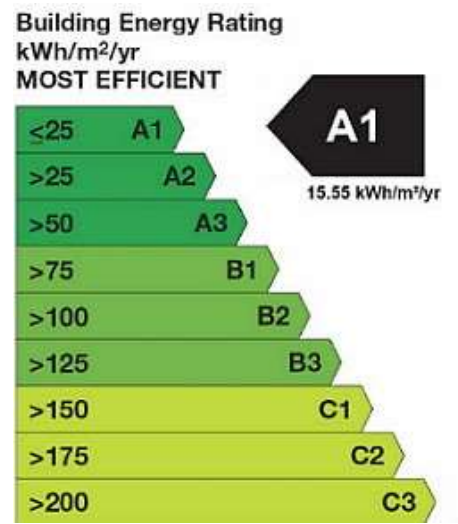
- Existing Window/Door U-Value = 2.8 – 3.1 W/m²K
- Installation Triple glazed Windows
- Improved Window/Door U-VALUE = 0.85 W/M²k
- Cost per Unit = €5,000.00

Controlled Ventilation:

- Existing Ventilation = Natural or None
- Upgraded to Demand Controlled Ventilation
- Humidity sensors and Standard Controls
- Cost per Unit = €2,000.00

RESULTS:

- 1 A3 – 10 A2'S – 1 A1
- Costs - €300,000.00
- SEAI Grant Funding at 50% - €150,000.00
- Average Cost per unit - €25,000.00
- After Grant Funding - €12,500.00
- Reduced Costs
- Reduced Maintenance
- Better Air Quality



5.5 Interreg EU Funded Projects

Bucanier Project

Approximately 120 small businesses in Wales and Ireland are set to benefit from a new €2.9 million EU funded scheme. BUCANIER (Building Clusters and Networks in Innovation Enterprise and Research) aims to support small businesses on the Irish Sea border over the next three years. It seeks to increase innovation capacity within SMEs and social enterprises by collaborating with Higher Education institutions and other public bodies to boost productivity across Ireland and Wales.

The project will work in the key growth sectors of the Welsh and Irish economies, food and drink, life sciences and renewable energy. The project will see lead partner Pembrokeshire County Council join forces with Swansea University and Carmarthenshire Council in Wales and Institute of Technology Carlow, Bord Iascaigh Mhara and Wexford County Council in Ireland. BUCANIER will deliver innovation master-classes, offer business mentoring and create new networks between Wales and Ireland which are aimed at helping enterprises in the same sectors share knowledge, increase cross-border trade and create new jobs

The project will invest in ideas for the design, development, testing and delivery of new products, processes and services by applying design based innovation that will bring new product/service ideas closer to the commercial market. BUCANIER will also assist the formation of cross-border clusters and networks that allow the transfer of knowledge between Higher Education Institutes and SMESs. The aim is to develop the efficiency of the industry by sharing knowledge, practices and contracts

The BUCANIER Project hosted a seminar on 10th May 2019 on “**Renewable Energy for SMEs**”. The seminar was aimed at small business owners and stakeholders from Ireland and Wales.

The Sustainable Energy Authority of Ireland (SEAI) gave an overview of supports for SMEs in this area, and was followed with practical advice from companies, to inform business owners on the various technologies and opportunities for energy efficiency which they should be exploring.



5.6 Renewable Energy

The term renewable energy generally refers to electricity supplied from renewable energy sources, such as wind and solar power, geothermal, hydropower and various forms of biomass. Renewable energy deployment can provide jobs and income and mitigate climate change thereby reducing dependency on fossil fuels and the emission of greenhouse gases.

The Renewables Directive (2009/28/EC) requires that 20% of the EU’s energy consumption across the electricity, transport and heat sectors is from renewable sources by 2020. Ireland's target is 16% of all energy consumed across the three sectors to come from renewable sources by 2020. The two principle/potential methods of renewable energy generation in the county are through wind and more recently through solar power.

5.6.1 Wind Energy

The Irish Wind Energy Association identified the following in 2016:

- Installed Capacity in the Republic of Ireland: 2,659 MW
- Wind farms in the Republic of Ireland: 215

In County Wexford:

- Installed Capacity: 176 MW (6th highest producer nationally)
- Number of Wind farms: 11

5.6.2 Solar Energy

As of November 2016, over a hundred applications for utility scale Solar Photo Voltaic farms have been lodged with Irish planning authorities for an estimated 725MW of solar PV generation potential. The combined site area for these schemes is 1,625 hectares. County Wexford, particularly the south of the county, has some of the highest solar irradiation yields in the country, thus making it attractive for Solar PV developments

In County Wexford: (as of April 2019)

- 34 solar farms have been granted with a combined output of 342 MW and covering an area of approximately 667Ha.
- 2 further applications under appeal with a combined output of 115 MW and covering an area of approximately 185 Ha.
- No Solar PV farms been constructed in the county to date

6. Adaptation Goals, Objectives and Actions

The risks posed by climate change have been prioritised for Wexford County in the previous chapter. In this chapter we;

- Identify recurring thematic areas, these are useful to identify, in order to target adaptation goals and objectives
- Identify adaptation goals (long-term) and objectives (sequenced) to support Wexford County Council in achieving climate resilience.
- Identify a range of potentially appropriate adaptation actions to enhance the capacity of Wexford County Council and the community to adapt to climate change impacts and to address priority climate risks in the context of projected climate change.
- Prioritise adaptation actions and develop implementation and monitoring plans

6.1 Identification of thematic areas

In order to identify goals and objectives to support Wexford County Council in achieving climate resilience, it is first necessary to identify what thematic areas are most appropriate to target. These are developed from an assessment of Impacts and Risks done in previous chapters. The appropriate recurring thematic areas are identified in figure 6.1.



Figure 6.1 Thematic Areas of Climate Adaptation for Wexford

6.2 Identifying adaptation goals and objectives

The thematic areas are developed further to create high levels goals within these areas. These goals identify the desired outcomes anticipated through the proper implementation of the climate change adaptation strategy. They are supported by specific objectives and adaptation actions to achieve their desired outcomes.

<p>Theme 1: Local Adaptation Governance and Business Operations</p> <p>Goal: Climate change adaptation considerations are mainstreamed and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change</p>
<p>Theme 2: Infrastructure and Built Environment</p> <p>Goal: Increased capacity for climate change resilient structural infrastructure is centred around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society</p>
<p>Theme 3: Landuse and Development</p> <p>Goal: Sustainable policies and measures are devised and implemented to influence positive behavioural changes, support climate adaptation actions and endorse approaches for successful transition to low carbon resilient society</p>
<p>Theme 4: Drainage and Flood Management</p> <p>Goal: Great understanding of risks and consequences of flooding and successful management of a co-ordinated approach to drainage and flooding.</p>
<p>Theme 5: Natural Resources and Cultural Infrastructure</p> <p>Goal: Fostering and implementing meaningful approaches to protect natural and key cultural assets through an appreciation for the adaptive capacity of the natural environment to absorb the impacts of climate change.</p>
<p>Theme 6: Community Health and Wellbeing</p> <p>Goal: Empowered and cohesive communities with strong understanding of climate risk, increased resilience to impacts of climate change with capacity to champion climate action at local level</p>

Table 6.1 Thematic Areas and Goals for Wexford County Council Climate Adaptation Strategy.

6.3 Identifying adaptation actions



In order to achieve the adaptation goals outlined and associated objectives it is necessary to identify adaptation actions. To achieve the objectives a portfolio of adaptation actions will be required that can be delivered over a range of timeframes (working in concert). The adaptation goals and objectives will call for a range of actions that will require varying levels of investment and resources in terms of time, finances, data and personnel requirements.

Actions are identified in the relevant action plans produced in Table 6.2. These actions may involve a mixture of grey, green and soft measures for the operational and functional areas of Wexford County Council who have a role in their implementation and delivery. In these action plans the relevant sectors/departments responsible for the achievement of local level goals and objectives are identified under '**Lead and Partner**': The role of partner is as considered appropriate and necessary by Wexford County Council to fulfil the implementation of the action.

Actions required to fulfil goals and associated objectives will also have varying timeframes.

Timeframes are defined as Short term(S) 1-3 years, Medium Term(M), 4-5 years, Long Term(L) 5+ years

Table 6.2 Adaptation Actions based on Thematic Areas

Theme 1: Local Adaptation Governance and Business Operations

Objective: To ensure the progression and implementation of local climate change adaptation actions in Wexford County Council.				
No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Establish a Climate Action Steering Group with representatives from across key functions of local authority to ensure the successful implementation of the actions of this Climate Change Adaptation Strategy and to report on progress.	Executive Team (L)	Short	Y
2	Mainstream Climate Action policy as integral consideration in the Corporate Plan objectives providing for the all local authority activities and the delivery of functions and services across the administrative area	Corporate Services (L) Executive Team (P)	Short-Medium	Y
3	The Appointment of a designated Climate Action officer at executive scientist/engineer grade is recommended	Senior Management Team (L) Executive Team (p) Human Resources (P)	Short	N
4	Consider a change in directors role and title from Director of Services, Housing, Community, Libraries, Arts, Emergency Services & Environment, Enniscorthy Municipal District to Director of Services, Housing, Community, Libraries, Arts, Emergency Services, Environment and Climate Change, Enniscorthy Municipal District	Executive Team (L) Human Resources (P)	Medium	Y
5	Establish a climate champion within each section of the organisation.	Executive Team (L)	Short	Y
6	Promote and encourage the public to sign up to mapalserter and twitter notifications for extreme weather notifications and alerts including coastal alerts	IT (L) Environment Section(P)	Short	Y

Objective : To ensure that climate change adaptation actions are mainstreamed into all activities of Wexford County Council.				
No	Action	Lead & Partner(s)	Timeframe	Budget
7	Ensure through the delivery of all services, functions and activities that there is more effective implementation of relevant regulations, policies, plans and strategies with a role in climate adaptation and environmental protection	Senior Management Team		
8	Integrate Climate Action into the Service Delivery Programme and provide for its translation to Team Development Plans to enable actions to be directly pursued per operational area	Senior Management Team (L) Executive Team (P)	Short-medium	Y
9	Use the offices of the procurement officer to promote green procurement in Wexford County Council such that services, goods, and works procured contribute to and support climate action objectives and wider environmental objectives whilst representing value for money	Procurement (L) Executive team (P)	Short (and ongoing)	Y
10	The Climate Action Steering Group will be assigned with managing and overseeing the effective mainstreaming of Adaptation measures into plans, programmes, strategies and policies of Wexford County Council	Senior Management Team (L) Executive Team (P) Climate Action Steering (P) Group	Short	Y

Objective: To Build capacity and resilience in Wexford County Council to support service delivery.				
No	Action	Lead & Partner(s)	Timeframe	Budget
11	Promote the incorporation of the paperless strategy into all areas of Wexford County Council. Moving from paper to electronic will also facilitate the provision of a sustainable and accessible service, tapping into the resources available in this digital age. This will support maintenance of service provision even when the offices are closed for example during heavy snow	Corporate Services (L) Executive team (P)	Short - Medium	N
12	Review and Develop the Business Continuity Plan to identify and address specifically, the impacts associated with extreme weather events on all IT functions/services of the local authority and explore potential opportunities to increase resilience. This will involve: <ul style="list-style-type: none"> Preparing for critical services disruptions, 	IT Department (L)	Short	N

	<ul style="list-style-type: none"> Assessment of the Local Authority's back-up system's infrastructure and review of power outage back-up procedures to ensure resilience. Developing a network access contingency plan for identified essential key staff to be able to access all essential council systems remotely due to a climate event to reduce or eliminate climate event impacts on statutory deadlines and backlog 			
13	Develop a vehicle policy to include for the use of vehicles suitably adapted for extreme weather events and undertake vehicle suitability assessments regularly to ensure timely and necessary maintenance for effective operation in challenging conditions	Senior Engineer Roads (L) H & S (P) Chief Fire Officer (P)	Short	N
14	Develop a centralised repository for information gathered on extreme events including costings/mapping etc.	Executive Team (L) Finance IT (P) Municipal Districts (P)	Short	N
15	Continue to develop on the internal severe weather plan, flood plan and major emergency plan to avoid ambiguity, increase staff awareness, highlight potential risk to safety and to ensure all staff travel only in safe conditions	Major Emergency Development Committee(L) Emergency services (P) Human Resources (P), IT(P), Civil Defence, H&S(P)	Short	Y
16	Health and safety risks relating to Climate Change and extreme weather events to be considered at the review of the parent Safety Statement in December 2019	H & S (L) Major Emergency Development Committee(P)	Short	N
17	Evaluate and document resources deployed for the management, maintenance, repairs and clean-up operations after extreme weather events taking full account of hours and costs involved and impact on service delivery and including: Increased operational costs Increased maintenance costs Increased contractor and out-of hours costs Additional funding sought/received	Major Emergency Development committee (L) Roads (P) Emergency services (P) Finance(P) Municipal Districts (P) Environment (P)	Short-Long	Y
18	Build expertise, capacity and increase knowledge base through relevant training programmes on Climate Change and its implications on the operations/functions of Wexford County Council.	ExecutiveTeam (L) Communications officer (P) Health & Safety(P) Human Resources (P)	Short-Medium	N

Objective: To Identify and support opportunities that may arise from pursuing adaption efforts through the functions of Wexford County Council.				
No.	Action	Lead & Partner(s)	Timeframe	Budget
19	Identify and source funding streams for the active implementation of adaptation and mitigation actions and measures across County Wexford.	Director of Services (L) Executive Team (P) LEO, CARO (P)	Short	N
20	Through the work of the LEO Wexford, support, encourage and nurture new ideas seeking to capture opportunities associated with environmental and technological advances that support low carbon transition. eg. Energy Summit	LEO (L) 3 CEA (P) Executive Team (P) CARO (P)	Short – Long	N
21	Encourage and promote renewable energy generation and storage technologies that will contribute positively and grow the Circular and Bio-economy to promote sustainable rural and urban economic development as part of the overall aim of transiting to a low carbon economy with reduced greenhouse gases.	Executive Team (L) 3CEA (P) LEO (P) LASNTG (P) WERLA (P)	Short – Long	Y
22	Liaise, collaborate and work in partnership with the sectors identified in the National Adaptation Framework, subject to funding, in the delivery of the Government approved sectoral adaptation actions, where they relate and are relevant to the functions and activities of the council at local level/in local communities.	Sectoral strategies	Long	Y

Theme 2: Infrastructure and Built Environment

Objective: To ensure and increase the resilience of infrastructural assets and inform investment decisions				
No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Identify asset manager and apply a robust risk assessment and management framework to Local Authority owned buildings, properties and built heritage to identify and protect against the key vulnerabilities to the impacts of climate change and mitigate against service disruption	Executive Team (L)	Short- Medium- Long	Y

2	Integrate climate considerations into the design, planning and construction of all roads, bridges, housing, public realm and other construction projects and make provision to incorporate green infrastructure as a mechanism for carbon offset in such projects as well as for wider environmental benefits such as providing shade to alleviate heat stress, supporting urban biodiversity, water retention and flood alleviation.	Executive Team (L)	Short-Medium-Long	N
3	Undertake a Risk Assessment of road infrastructure to identify the severity of climate change risks on their function and condition. The findings should be integrated into decision making processes, road infrastructure programmes and investment strategies.	Road Department (L) Executive Team	Medium	N
4	Undertake risk assessment of all existing Local authority buildings, housing stock including derelict and vacant building and built heritage for extreme weather events and assess for future impacts from climate change.	Property department (L) Housing Department (P) Municipal Districts (P)	Medium	N
5	Explore ways to minimise the expected increase in maintenance requirements and costs to roads, housing, water and wastewater infrastructure from climate stress: Integrating climate change considerations at design stages. Explore the climate resilience of materials used in road, housing water & wastewater construction and maintenance Examine options to reduce road settlement due to severe weather events Assessment of gully clearing and maintenance plans with aim to become more proactive to reduce costs in the future	Executive team(L) Roads Department (P) Housing Department (P) Water Services(P) IW	Medium	N
6	Undertake a monitoring and inspection programme for vulnerable areas of the coast in particular following extreme weather events.	Environment section (L) Executive team (P)	Short	Y
7	Undertake a monitoring and inspection programme for harbours piers, marinas and quays	Environment section (L) Executive team (P)	Short	N
8	Develop a procedure to prioritise major fishing harbours, piers and marinas for clearance and access as best practice in extreme weather events	Environment (L) Roads (P)	Short	Y
9	Undertake a Monitoring and Maintenance programme on existing public coastal defences	Environment Section(L)	Short	Y
10	Develop an inventory of all back up equipment available for water abstraction and wastewater treatment infrastructure for use during extreme weather events and review and develop on remote monitoring and adjustments of systems.	Water Services (L) Irish water (P)	Medium - Long	N

Objective: To work towards the objective for a low carbon society				
11	Prepare an Energy engagement strategy for the organisation to facilitate behavioural change relating to improved energy efficiency and associated reduction in carbon emissions.	Environment Section (L) 3CEA (P) Special Projects (P) Executive Team (P)	Medium	N
12	Review of Wexford Co Co developments with a view to ensuring energy efficiency measures are being considering at the design stage and incorporated during construction and operation phases. New Local Authority Buildings and housing stock should be built to nZEB or passive housing standards and to take account of climate change adaptation.	Executive team (L) 3CEA (P) Housing (P) Special Projects (P)	Short - Long	Y
13	Continue to support the roll out of the Public lighting retrofits. Public lighting is Wexford County Council's largest consumer of energy at up to 60% of the total energy consumption of the council. 40% of public lights switched to date which shall increase to 60% by end 2019 and 100% by 2020.	Roads Section (L) 3CEA (P) Environment section (P)	Short -Long	Y
14	Promote Wexford as a low carbon county and to facilitate the development of energy sources which will achieve low carbon	Environment section (L) 3CEA (P) LEO(P)	Short-Long	Y
15	Provide information and advice to housing tenants to address fuel/energy poverty issues; minimize carbon emissions; improve air quality and improve health of residents.	Housing section (L) 3CEA (P)	Medium	Y
16	Wexford Town is a low smoke zone. Continue to highlight the health and environment benefits of using low smoke fuel and the air quality issues associated with smoky fuel. Wexford County Council is considering introducing a county wide smoky fuel ban in County Wexford.	Environment Section (L) Housing section (P)	Medium to Long	Y

Theme 3: Landuse and Development

Objective: To Integrate climate action considerations into land use planning policy and influence positive behaviour				
No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Identify and integrate climate change as a critical consideration and guiding principle informing core strategic objectives policies and development standards of the County Development Plan.	Planning section (L)	Short	Y
2	During the review of Wexford County Council Development Plan 2013-2019 examine and tailor planning policies to reduce the vulnerability of Co. Wexford to the impacts of climate change	Planning Section(L)	Medium	N
3	Integrate and promote climate-smart building and urban design performance outcomes in development standards through the development management process.	Planning Section(L) Housing section (P)	Short	Y
4	Ensure adherence to coastal management section of County development plan. Ensure collaborations with Waterford and Wicklow County Councils in relation to integrated Coastal Zone management.	Planning Section (L) Environment Section (P) Waterford Co Co (P) Wicklow Co Co (P)	Short	Y
5	Ensure Sea level change is incorporated into all flood risk mapping in association with the Irish Coastal Protection strategy Study	Planning (L) Environment Section (P)	Short	Y
6	Support the objectives of the County Development plan in particular CZM09 and CZM10 in restricting development outside the boundaries of existing coastal settlements to that which is required while directing new development away from coastal settlements in addition to CC09 which looks to promote and encourage new developments to mitigate against and adapt to climate change through location layout and design of the development	Planning Section (L) Environment Section (P)	Short - Long	Y
7	Promote the integrated planning, design and delivery of green infrastructure (including urban greening) through appropriate provisions in planning policies, development standards, infrastructural, public realm and community projects.	Planning (L) Community Development (P)	Short – Long	N
8	Research and incorporate, in the context of the County Development Plan,	Planning Section (L)	Short - Long	N

	measures in accordance with section 10 (n) of the Planning and Development Acts 2000 (as amended) for: the promotion of sustainable settlement and transportation strategies in urban and rural areas including the promotion of measures to— (i) reduce energy demand in response to the likelihood of increases in energy and other costs due to long-term decline in non-renewable resources, (ii) reduce anthropogenic greenhouse gas emissions, and (iii) address the necessity of adaptation to climate change; in particular, having regard to location, layout and design of new development;	Environment Section (P) CARO(P)		
9	Support the rollout of Electric Vehicle (EV) charging Infrastructure on: Sites owned and occupied by Wexford County Council. Private sites through supportive policies and development control standards.	Environment (L) 3CEA (P) Planning (P) Executive Team (P) Roads(P) Property(P)	Short	N
10	Increase awareness of local authority housing tenants on the potential impacts on housing from climate change events. This is to include updating the tenants handbook to provide the necessary climate change resilience information to tenants and providing Local authority housing tenants with “Preparing for the unexpected” written guide to help tenants prepare for emergencies such as severe weather events. The guide will support tenants, help them make sensible preparations in advance so they can be more self-sufficient during an emergency.	Housing Section (L) Community Section (P)	Short	Y

Theme 4: Drainage and Flood Management

Objective: To promote flood risk mitigation through a variety of responses

No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Work with CFRAM programme to prioritise projects to reduce surface water flood risk and provide for detailed mapping of areas prone to surface water, groundwater flood risk and sea level rise. The outputs from the second cycle of CFRAMS is underway and covers areas outside the scope of the first cycle including more rural areas and will help inform the implementation of the strategy.	Executive Team (L) Road Department (P) Planning section (P) Environment Section (P)	Short	Y
2	Stipulate the requirement for the design and specification of urban storm water drainage systems for new developments to take account of the potential future impact of climate change.	Executive Team (L) Planning section (L) Special Projects (P)	Short	Y
3	Incorporate the requirement for Sustainable Urban Drainage Systems where appropriate in local authority projects and private development sites.	Planning Section (L) Road Department (P) Housing Section (P) Municipal Districts (P)	Short	Y
4	Assess the need for upgrades of drainage systems including separation of sewer and surface water required to reduce risk of capacity pressure on drainage systems.	Roads (L) Irish Water (P) Municipal Districts (P)	Short - Long	N
5	Incorporate considerations of the impact of climate change into proposals submitted under the OPW Minor Works Programme to ensure that measures proposed are adaptable to future changes.	Executive team (L) OPW (P) CARO (P)	Short-Long	Y
6	Assess potential of identifying and designating Natural Planning Flood Plains by way of a Green Infrastructure Strategy to allow for natural and unhindered inundation.	Planning Special projects	Short	N
7	Ensure that potential future flood information is obtained by way of a Flood Risk Assessment (FRA) and used to inform suitable adaptation requirements within the Development Management process and for preparation of the County Development Plan, in line with the Guidelines for Planning Authorities on Flood Risk Management (DoECLG & OPW, 2009).	Planning Section (P) OPW (L)	Short-long	Y
8	Ensure that major emergency response plan and Flood Plan are reviewed annually to ensure the appropriate resource capacity is in place to provide an effective flood emergency response.	Major Emergency Development Committee (L) Road Department (P) Fire Services.(P)	Short	Y
9	Evaluate the stock and equipment in place, to ensure equipment is readily available for times of flood, to minimise the impacts on people and property	Major Emergency Development Committee (L)	Short	Y

		Municipal District offices (P) Road Department (P)		
10	Develop a gulley maintenance and cleaning plan to ensure that programs are in place in all towns and villages prone to flooding and that all gulleys are cleaned in advance of the Autumn and winter seasons.	Road Department (L) Municipal District offices (P)	Short - Long	Y
11	Undertake a surface water management plan for the assessment and management of flood risks with the aim of reducing the adverse consequences of flooding and impacts on drinking water supplies and abstraction points to prioritise projects to reduce surface water flood risk and provide detailed mapping of areas prone to surface or groundwater risk.	Roads (L) Water Services (P) IW (P)	Medium	N
12	Consider expanding the early warning river water level alert currently in place to all flood risk areas.	Executive team (L) IT (P)	Short	N

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

No.	Action	Lead & Partner(s)	Timeframe	Budget
13	Ensure Emergency Services have access to adequate water during times of drought	Emergency Services (L) Water Services (P)	Short	Y
14	Explore ways to harvest and store water during times of significant rain to be used in drought times	Water Services (P) IW(L)	Medium	N
15	Assess how Wexford County Council can continue to supply adequately treated water during times of drought through alternative/additional ground or surface water supplies	Water Services (P) IW (L)	Medium	N

Theme 5: Natural Resources and Cultural Infrastructure

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

No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Undertake a risk assessment of trees located near critical infrastructure to examine their condition and the associated risk to infrastructure and public safety due to major wind events	Road Department (L) MD offices(P)	Short-Long	N
2	Develop a strategy to undertake and implement a Native tree planting programme in conjunction with an awareness campaign that informs of the benefits to communities in improving air quality, offsetting carbon emissions, promoting biodiversity, limiting flood risk, and reducing urban heat. Ensure that any trees to be planted are provided at locations that are suitable to avoid future impact to infrastructure or public safety.	Roads (L) Municipal District offices(P) Planning (P)	Short-Long	Y
3	Integrate natural borders/buffers to be included as an integral component of the design of greenways/blueways, tracks and trails and amenity areas to promote natural enhancement. Consult with NPWS to ensure buffer zones are provided, maintained and protected to avoid potential impacts on designated habitats or protected species and habitats and to protect and enhance wider biodiversity.	Road Department, NPWS (L) Special Projects (P) Planning Section(P) Environment Section (P)	Short-Long	N
4	Continue to support the roll out and continue to develop the draft Tourism strategy to include for and reduce the impact of Climate Change	Tourism officer (L)	Medium	N
5	Ensure the protection and improvement of waters in Wexford through the implementation of Water framework Directive, River Basin management Plan and Local Authority Water Programme takes account of climate change and associated impact on status of waters	Environment Section (L)	Short-Long	Y

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

6	Review of the Biodiversity Plan to ensure the actions within the plan promote best practice in relation to the adverse impacts of climate	Planning Section(L) Roads Section(P)	Short-Long	N
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	change.	NPWS (P)		
7	Develop and implement an awareness campaign around the role of the natural environment and its positive contribution to Climate Action through green schools.	Environment Section (L)	Short-Long	N
8	Continue to support measures to protect and enhance beaches in the county to retain the blue flag status and green coast awards	Environment Section	Short	Y
9	Ensure the protection and quality of bathing waters in County Wexford by continuing to implement the bathing water programme of sampling and testing before and during the bathing water season	Environment Section (L)	Short	Y
10	Promote the “Leave no Trace” scheme in place for Beaches and natural environment to increase awareness and promote and inspire responsible outdoor recreation through education, research and partnerships.	Environment Section (L)	Short	Y

Objective: To protect Heritage and Cultural Infrastructure

11	Provide Information Awareness of the impact of Climate Change on the Heritage and Cultural Assets of the County.	Planning Section (L)	Medium	Y
12	Protect wetlands from inappropriate infilling activities through the appropriate utilisation of the Waste Permitting Process	Environment section (L) Planning (P)	Short	Y
13	Support the ongoing programme for the use of virtual marker buoys as a navigational tool particularly in waters where changes in seabed levels occur especially following extreme weather events	Environment (L)	Short	Y

Theme 6: Community Health and Wellbeing

Objective: To build capacity and resilience within communities

No.	Action	Lead & Partner(s)	Timeframe	Budget
1	Through public participation network and the community resilience	PPN (L)	Short	Y

	group raise awareness of the impacts of climate change and ways for communities to increase response and resilience to these impacts.	Community Development (P) CARO (P)		
2	Explore ways in which Wexford County Council can assist communities across the county in the context of their vulnerability to the impacts of climate change.	Community Development(L) PPN (P) Community resilience team group (P)	Short/Medium	Y
3	Encourage community groups particularly Tidy Towns groups to consider climate change adaptation in their multi annual plans and programs to reduce climatic risks in their community	Environment Section (L) Community Development(P) PPN (P) Tidy Towns (P)	Short/Medium	Y
4	Assess how the Local Authority can continue to provide needed treated water during times of low rainfall to Wexford County Council group water schemes	Water Services (L) Environment (P) IW (P)	Short	N
5	Encourage more communities to actively pursue projects to reduce energy consumption and their carbon footprint	3CEA (L) PPN Community Development	Short	Y
6	Wexford County Council communications office in conjunction with the Library Service should develop a series of information packages on climate adaptation and mitigation and how individuals and communities can play their parts	Communications Office (L) Library (P)	Short	N

Chapter 7: Implementation Monitoring and Evaluation

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

The tasks of the group, are as follows:

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

The Eastern and Midland Climate Action Region Offices (E&M CARO) will continue to assist and provide guidance where possible in the practical implementation of the actions of this strategy. Wexford 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.

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.

2: Develop an approach and initiate implementation

The purpose of this task is to break down the adaptation framework into what actions will be taken and when, and who will carry out the actions by way of an Implementation Plan. The steering group will devise a methodology for implementation 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 the implementation plan. Once complete, key personnel can assume responsibility and begin implementing the adaptation actions.

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

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

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

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.

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 program to:

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

5: Report on progress

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

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

The progress report should provide for, inter alia:

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

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

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

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

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

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

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

Chapter 8 References

- Climate Action and Low carbon development Act No 46 of 2015
- Local Authority Adaptation Development Guidelines December 2018
- EPA Local Authority Adaptation Strategy Development Guideline Report 164
- EPA *Summary of the State of Knowledge on Climate Change Impacts for Ireland 2017*, Wexford County Council Severe Weather Plan
- Intergovernmental Panel on Climate Change 5th Assessment Report
- Wexford County Council Flood Plan
- Wexford County Council Major Emergency Plan
- Wexford County Development Plan 2013-2019
- National Adaptation Framework - Preparing for a Climate Resilient Ireland
- The EPA entitled *Summary of the State of Knowledge on Climate Change Impacts for Ireland 2017*
- Our Irelands Environment: An assessment 2016 (EPA, 2016)
- Wexford County Council Economic & Community Investment Programme 2018 -2022
- A new Development Plan for County Wexford Issues Papers for Public Consultation
- Nolan, P. 2015. EPA Report: Ensemble of Regional Climate Model Projections for Ireland. EPA climate change research report no. 159. EPA: Wexford.
- O’Sullivan, J., Sweeney, C., Nolan, P. and Gleeson, E., 2015. A high-resolution, multi-model analysis of Irish temperatures for the mid-21st century. *International Journal of Climatology*. doi: 10.1002/joc.4419.
- Climate Change Impacts on Coastal Areas
- Irish Coastal Protection Strategy Study - Phase 2 - South East Coast
- Irish Coastal Protection Strategy Study - Phase 3 - South Coast
- Strategic review Coastal erosion in Ireland by RPS on behalf of Wexford County Council
- OPW Flood Risk Maps
- www.climateireland.ie
- www.met.ie
- www.opw.ie
- www.floodinfo.ie
- www.enniscorthyfds.ie
- www.airo.ie
- Building Regulations Part L
- Wexford 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 Heat7