LIMERICK DEVELOPMENT PLAN 2022-2028

Background Paper

Energy, Climate Change, Flooding and Transition to a Low Carbon Economy

ATLANTIC EDGE
LIMERICK
EUROPEAN EMBRACE

Comhairle Cathrach & Contae **Luimnigh**

Limerick City & County Council

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1.0 – Introduction

Our climate is changing rapidly and the effects on the country and on our lives is becoming more evident. The response to the effects are wide ranging and have economic, environmental and social costs associated with them. The business as usual model, cannot continue and there is a need to reconsider the approach to the way we live our daily lives in terms of reducing the impacts of climate change, human activities are increasingly influencing the climate and the earth's temperature.

Spurred on by both the need for climate action and the need for energy security the question of renewable energy production has assumed greater importance over the last decade and that coupled with significant changes in technology, has resulted in a shift in terms of securing renewable energy. Large-scale solar applications had not been anticipated in Limerick in 2010, when the Limerick County Development Plan 2010 – 2016 (as extended) was prepared, however, in the last four years, twelve solar farms have been granted planning permission for solar farms throughout County Limerick. The bulk of the renewable energy production in Limerick comes from wind, with 15 wind farms in operation, mostly in the west of the County.

As part of the response to climate change, Climate Action Regional Offices have been established and Limerick sits within the Atlantic Seaboard South Region. The question of improving infrastructure, both to deal with the effects of climate change and to ensure continuity of services such as energy transmission, transport and waste and water infrastructure is essential, when considering climate adaptation.

All common forms of infrastructure, such as roads and electricity distribution are likely to suffer from the effects of climate change. This raises the question of climate proofing the infrastructure, on which modern society depends and the policy content of the plan would need to be updated to take this into account.

There are a number of issues, which, will be addressed in this paper, including renewable energy, climate change, flood risk and transition to a low carbon economy, all intrinsically linked, all issues that are experienced in Limerick and that are relevant to the preparation of the proposed Limerick Development Plan 2022 – 2028.

This paper is divided into three sections, the first dealing with energy, the second with climate change and flooding and the third dealing with a transition to a low carbon economy. Each section begins with an examination of background legislation and policy and then progresses to looking at the differing issues within Limerick. There is some repetition between each section, and to avoid repetition, legalisation won't be repeated. These papers are not intended to be exhaustive but are intended to prompt thought and to encourage submissions to the Development Plan review process.

2.0 – Energy

2.1 – Introduction

The transition to renewable energy sources and associated energy conservation and storage measures is a complex subject with implications for the whole of society and its entire range of economic activities. Different sectors will have different needs and some like agriculture will be both producers and consumers of energy. The section looks at the question of renewable energy and its implications for the preparation of the proposed Limerick Development Plan 2022 – 2028.

The paper is structured as follows; the introduction is followed by a section on legislation and policy, which lays out the statutory and guidance background from EU to national and regional level and county level. The second section highlights some of the key areas for action. This approach is intended to give a focus to the paper by concentrating on themes, which are relevant and need consideration. The final section acts as summary and outlines the important issues that will influence the plan review.

Ireland has excellent renewable energy resources, which will be a critical and growing component of Irish energy supply to 2020 and beyond. Indigenous renewable energy already plays a vital role in our domestic fuel mix. It also increases sustainability with clean power sources and enhances energy security by reducing Ireland's dependence on imported fuels. Wind, bio-energy and solar energy remain the main sources of renewable energy production in Ireland.

2.2 – Legislation and Background Policy

2.2.1 – International Context

The United Nations Framework Convention on Climate Change (UNFCCC), 2014 is the international legal framework for addressing climate change at a global level. The ultimate objective of the Convention is to stabilise global greenhouse gas (GHG) concentrations. Ireland's target is part of the pledged EU target of at least 40% reduction in domestic GHG emissions by 2030 compared to 1990.

The 2015 Paris Agreement, (12 December 2015), is the latest step in the efforts of UN climate change initiative and builds on the work undertaken under the Convention. The Paris Agreement intention is intensify the actions and investment needed for a sustainable low carbon future, while individual member state targets have yet to be agreed.

2.2.2 – European Context

At EU level, a white paper on adapting to climate change was published in 2009. Following this, an EU Climate Adaptation Strategy was published in April 2013. It has three main objectives:

- Promoting action by Member States - the Commission has been encouraging all Member States to adopt comprehensive adaptation strategies, and provides funding to support member states build up their adaptation capacities and take action;

- 'Climate-proofing' action at EU level – the Commission has promoted the integration of climate adaptation into EU policies - in key vulnerable sectors such as agriculture, fisheries and its cohesion policy - to help to ensure that Europe's infrastructure is made more resilient. Economic and social cohesion – as defined in the 1986 Single European Act – is about 'reducing disparities between the various regions'. In the case of climate adaptation it means the integration of climate adaptation into all EU activities;
- Better-informed decision-making – the Commission is attempting to address gaps in knowledge about adaptation and has developed a European climate adaptation platform (Climate-ADAPT) as a 'one-stop shop' for adaptation information in Europe.

The European Union (EU) has put in place a framework for energy for all member states called the '2020 Climate and Energy Package'. This is legally binding legislation for all member states, so that the EU as a whole will achieve 20% GHG emissions reductions, 20% energy produced by renewable resources, and 20% increase in energy efficiency by 2020. From this overarching EU climate and energy package, the EU Energy Efficiency Directive 2012/27/EU, and Renewable Energy Directive 2009/28/EC have resulted in national level energy actions plans in Ireland.

Under the Renewable Energy Directive, Ireland has been set a target of 16% of all non-Emission Trading Scheme (ETC) energy consumption to come from renewable energy sources by 2020, the sectoral split being 40% electricity, 12% heat and 10% transport energy.

In October 2014, as there was no clear indications for post the 2020 target, the EU put in place a new '2030 Framework for Climate and Energy Policies' which has set a 40% GHG reduction on 1990 GHG levels, and an EU-wide target of 27% for renewable energy and energy savings by 2030.

2.3 – National Context

At national level, the National Policy Position on Climate Action and Low Carbon Development (2014) sets out the national objective of achieving a transition to a low carbon economy. This was given legislative effect by the Climate Action and Low Carbon Act 2015. The Act provided for the development of a National Adaptation Framework (NAF), which was published in December 2017. The NAF required sectoral and local adaptation strategies, which were prepared in 2019.

Each local authority was required to develop a Climate Adaptation Strategy for the period 2019 – 2024. Local strategies will "be used to inform development plans and other statutory plans and policies of the Local Authority."(Department of Communications, Climate Action and Environment 2018).The Limerick Climate Change Adaptation Strategy was adopted in July 2019. One of the issues that emerged in that strategy was the need to take into account the effects of climate change on infrastructure and the need to encourage different agencies to cooperate in infrastructure management and provision in a climate altered future. The next step in the process will be the incorporation of relevant adaptation actions in the Development Plan.

2.3.1 – The Strategy for Renewable Energy 2012 – 2020

The Strategy for Renewable Energy 2012 – 2020 sets out the Government's strategic goals for renewable energy and the key actions underway and planned in the short to medium term for each of the sectors. Strategic goals are designed to address challenges and support the delivery of renewable electricity, heat and transport. The Strategy for Renewable Energy 2012 – 2020 is underpinned by the detailed National Renewable Energy Action Plan and sets out the Government's strategic goals for each of the renewable sectors.

2.3.2 – The National Renewable Energy Action Plan (2010)

Ireland's National Renewable Energy Action Plan (NREAP) to 2020 is the framework within which Ireland has set out the measures underway and planned to deliver energy growth from renewable sources in line with EU targets. Ireland is obliged to report to the EU Commission on progress (as well as obstacles to progress). The NREAP requires that all sectors, including local authorities, consider the actions and targets in the NREAP and identify how it is intended to contribute to the achievement of these targets.

2.3.3 – Energy White Paper, Ireland's Transition to a Low Carbon Energy Future 2015 – 2030

Ireland's long-term energy policy framework is set out in the 2015 Energy White Paper, Ireland's Transition to a Low Carbon Energy Future 2015-2030. This sets out a framework to guide Irish energy policy in the period up to 2030 and sets out a vision for a huge transformation of Ireland's energy systems; moving to lower emissions

fuels and ultimately towards a lower reliance on fossil fuels; significantly increasing renewable generation; achieving change in energy efficiency performance; implementing smart and interconnected energy systems; strong regulatory structures and markets; and repositioning energy consumers to have a more active role within the energy sector. An annual review and update is due to be undertaken in 2020.

2.3.4 – Climate Action and Low Carbon Development Act (2015)

This Act provides for the making of:

• Five yearly National Mitigation Plans to specify the policy measures to reduce greenhouse gas emissions;

• A National Adaptation Framework to specify the national strategy for the application of adaptation measures in different sectors and by local authorities to reduce the vulnerability of the State to the negative effects of climate change.

The National Mitigation Plan and the National Adaptation Framework have now been published. These have been the backdrop to the Local Authority Climate Adaptation Strategies which were prepared in 2019. The Act also established the Climate Change Advisory Council to advise ministers and the government on climate change matters.

The National Low-Carbon Roadmaps and the National Climate Change Adaptation Frameworks are the important parts of the process through which government will develop and progress, mitigation and adaptation policy in order to enable the State to pursue and achieve transition to a low-carbon, climate – resilient and environmentally sustainable

economy in the period to 2050. A series of national plans will be adopted and reviewed on a structured basis, with authority set down in primary legislation, to ensure a coherent and comprehensive policy across all key sectors, and to provide maximum clarity and policy certainty for business and stakeholders generally. The structural basis for national plans on mitigation and adaptation will reflect government commitment to transparency and inclusiveness. Accountability on national policy will include annual reporting to Dail Eireann.
The low-carbon road mapping process will be guided by a long-term vision of low-carbon transition based on:

• An aggregate reduction in carbon dioxide (CO2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and

• In parallel with this, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production, will be agreed.

2.3.5 – National Mitigation Plans (2017) and National Adaptation Frameworks (2018)

As provided for in the 2015 Climate Action and Low Carbon Development Act, in order to pursue and achieve the national transition objective, the Minister for Communications, Climate Action and Environment must make and submit to Government a series of successive National Mitigation Plans (NMPs) and National Adaptation Frameworks (NAFs).

The first National Mitigation Plan was published in July 2017 and contains seventy specific mitigation measures and one hundred and six individual actions across Government ministries to support the move to a low carbon economy and society. The Plan contains separate sectoral mitigation transition statements for the four sectors covered under the NMP (Electricity Generation, the Built Environment, Transport and Agriculture) and projections of future emissions.

The first National Adaptation Framework was published in January 2018 and seeks to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. Under the NAF a number of Government Departments were required to prepare sectoral adaptation plans for their areas of responsibility and local authorities were required to prepare local adaptation strategies.

2.4 – Local Adaptation Strategies – Local Authorities and Climate Change

Local authorities will play a key role in helping the country to adjust to the effects of climate change. The local government sector will play a huge role, at county and city level, in planning for, and responding to, emergencies. Given their close relationship with the community, local authorities can react faster and more effectively to local climate events then other government agencies. This has been demonstrated in their response to extreme weather events in Ireland in recent years. They have essential local knowledge of the natural and manmade environment and have a critical role to play in managing climate risks and vulnerabilities and identifying adaptation actions. They also deliver key services to the public either directly or in partnership with other government departments such as housing, planning, sanitation and maintenance of local roads, parks and waterways.

The Climate Action Regional Offices are being operated by a lead local authority in four different regions that have been grouped together based on climate risk assessment with a focus on the predominant risk(s) in each geographical area. Cork County Council is the lead authority for the Southern Region, in which Limerick is located. The establishment of these offices will enable a more coordinated engagement across the whole of government and will help build on the experience and expertise which exists across the sector.

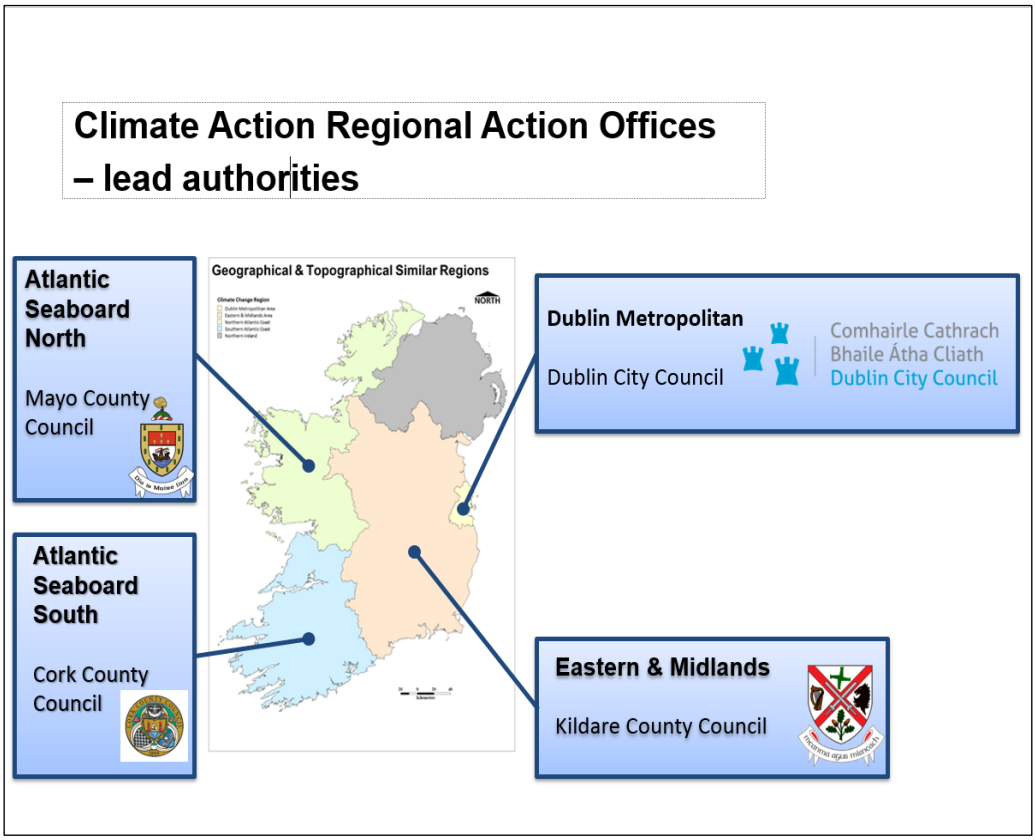

Figure 1: CARO regional offices and the four climate action regions around the country

2.4.1 – Climate Adaptation Strategy for Limerick (2019)

All Local Authorities were tasked with producing a Climate Adaptation Strategy for their functional areas. Limerick City and County Council developed the Limerick City and County Climate Adaptation Strategy, which was adopted in July 2019.

The Limerick Climate Change Adaptation Strategy has the following actions for the Forward/Strategic Planning Section; these will inform the policy content of the proposed Development Plan.

- Integrate Climate Change Adaptation Planning into all plans, strategies and policies prepared by the Council, including Development Plans, Local Area Plans, and Master plans, Transportation Plans and Tourism and Economic Plans.
- Ensure that Development Plan policies take account of climate proofing for infrastructure such as electricity, communications and water services.

2.4.2 – Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change (2017)

In 2017, the DoHPCLG published the Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change. These guidelines require planning authorities, in making, reviewing, amending or varying a development plan or local area plan to:

(a) ensure that overall national policy on renewable energy as contained in documents such as the 'White Paper', 'NREAP', the 'Strategy for Renewable Energy' and the 'National Mitigation Plan', is acknowledged and documented in the relevant development plan or local area plan. It is likely that this will be included in the infrastructure section of the new development plan.

(b) indicate how the implementation of the relevant development plan or local area plan will contribute to realising overall national targets on renewable energy and climate change mitigation, and in particular wind energy production and the potential wind energy resource; and

(c) Demonstrate detailed compliance with item (b) above in any proposal to introduce or vary a mandatory setback distance or distances for wind turbines from specified land uses or classes of land use into their development plan or local area plan. In Limerick's case, given its proximity to the River Shannon, there is a need to acknowledge the importance of the offshore wind resource and to provide policy support, both for offshore wind but also for the on shore facilities that are needed to support it.

2.4.3 – Draft National Energy and Climate Plan (2018)

The Minister for Communications, Climate Action and the Environment, published the first draft of Ireland's National Energy and Climate Plan (NECP) in December 2018. It was submitted to the European Commission.

The NECP will contain the policies and measures proposed to reach Ireland's 2030 goals, targets, and contributions. This first draft of the NECP takes into account energy and climate policies developed to date, the levels of demographic and economic growth identified in the NPF process and includes all of the climate and energy measures set out in the NDP 2018-2027. It is the first step in the process of putting together our final National Energy and Climate Plan and further iterations of the plan will take into account additional policies and measures and the all-of-Government climate action plan.

The draft NECP sets out the possible effects of many initiatives, which are being put in place;

• The investments in the National Development Plan will deliver a cumulative 22MT reduction in CO2. This represents one third of the emissions reduction needs to be achieved.

• Renewable energy sources in our power system will rise from 30% to at least 55% with a broader range of technologies likely to be deployed, e.g. offshore wind, solar and biomass. To avoid inconsistencies in supply it will be necessary to put in place technologies to store energy. This could take the form of battery storage or pumped storage (e.g. Turlough Hill), though this would be a big engineering challenge in its own right. One battery storage application has been received in Limerick and it is associated with the Athea wind farm.

• Coal and peat will be removed from electricity generation, which will almost halve the emissions from the electricity sector. In this regard, there is considerable potential for locally

grown biomass to play a role as a new feedstock. This would need to be carefully supported however, a lack of support has caused much disappointment and setbacks in the past.

• Use of electric vehicles in the transport fleet will rise to around 20%. This will have direct implications for infrastructure in that the necessary facilities, such as charging points will need to be there to support these vehicles.

• Energy improvements in newly built homes and energy refits in existing homes will mean that 40%-50% of homes will have high build energy ratings. Revisions of the building regulations have a direct role to play here. What should also be remembered is the introduction of small-scale renewable heating systems following the revision of the Building regulations in 2014. Technologies such as small scale geothermal, photovoltaic and air to water heating have become much more widespread in recent years. There have been changes too, to the planning exemptions, since 2011 as they relate to what are called micro-renewable (e.g. roof top mounted photo-voltaic cells). This has all played a part in the move towards renewable technologies.

• schemes such as the Support Scheme for Renewable Heat (SSRH) aims to convert 120,000 homes per annum from fossil fuels to heat pumps and solar panels.

• The support scheme for renewable heat (SSRH) will also enable the small and medium businesses to change their heat requirements away from fossil fuels to renewable generation technologies. This has implications for development plan policies in that policy support for the infrastructure required for these renewable heat sources needs to be put in place.

2.4.4 – The Climate Action Plan 2019 – To Tackle Climate Breakdown (2019)

Climate disruption is already having diverse and wide-ranging impacts on Ireland's environment, society, economic and natural resources. The Climate Action Plan sets out an ambitious course of action over the coming years to address the issue.

The Plan identifies the nature and scale of the challenge. It outlines the current situation across key sectors including electricity, transport, built environment, industry and agriculture and charts a course towards ambitious decarbonisation targets. Reflecting the central priority climate change will have in our political and administrative systems into the future, the Plan sets out governance arrangements including carbon-proofing policies, establishment of carbon budgets, a strengthening Climate Change Advisory Council and greater accountability to the Oireachtas.

The Climate Action Plan recognises that Ireland must significantly step up its commitments to tackle climate disruption. The Government and public bodies aim to play a major role in taking early action on climate to achieve decarbonisation goals.

The Climate Action Plan is committed to achieving a net zero carbon energy systems objective for Irish society and in the process, creates a resilient, vibrant and sustainable country.

Key aims include:

• A five-year Carbon Budget and sectoral targets with a detailed plan of actions to deliver them;

• A Climate Action Delivery Board overseen by the Department of the Taoiseach to ensure delivery;

• An independent Climate Action Council to recommend the Carbon Budget and evaluate policy;

• Strong accountability to an Oireachtas Climate Action Committee; and

• Carbon proofing all Government decisions and major investments.

While this framework of goals and performance monitoring is crucial, it will be equally important that every public body adopts a Mandate for Climate Action.

Some of the key measures, which will help create a framework across the entire public sector and beyond to support change shall include:

• Consistent development of a Green Procurement Strategy;

• Targets of 50% energy efficiency and 30% greenhouse gas emissions reduction;

• A pathway for the price of carbon to create incentives, which help, avoid the continued use of carbon intensive technologies;

• The realisation of the principle underpinning Project Ireland 2040 for compact, connected, and sustainable development, which has also been put forward in the RSES; and

• Competitive funding rounds to promote research and innovation to meet the climate challenge.

2.5 – Relevant Sectors

The following section looks at some of the key areas, which require action, in terms of meeting the requirements of the relevant legalisation.

2.5.1 – Electricity

There is a need to increase reliance on renewables from 30% to 70%, adding 12GW of renewable energy capacity (with peat and coal plants closing), put in place a coherent support scheme for micro-generation with a price for selling power to the grid. There is a need to open up opportunities for community participation in renewable generation as well as community gain arrangements, streamline the consent system, the connection arrangements, and the funding supports for the new technologies on and off shore.

2.5.2 – Buildings

Stricter requirements for new buildings and substantial refurbishments is required; design policy to get about 500,000 existing homes to upgrade to B2 Building Energy Rating and 400,000 to install heat pumps; build a supply chain and a model for aggregation where home retrofits are grouped together to allow this level of activity to be funded and delivered. Deliver two new district heating systems, and implement a roadmap for delivering District Heating potential. Increase attention to Energy and Carbon ratings in all aspects of managing property assets.

2.5.3 – Transport

Accelerate the take up of Electric Vehicles, both cars and vans, so that we reach 100% of all new cars and vans are EVs by 2030. This will enable achieving our target of 950,000 EVs on the road by 2030. This means approximately one third of all vehicles sold during the decade will be Battery Electric Vehicle (BEV) or Plug-in Hybrid Electric Vehicle (PHEV). Compact growth must ensure that less transport intensive is achieved through better planning, remote and home-working and modal shift to public transport. Increase the renewable bio fuel content of motor fuels. Set targets for the conversion of public transport fleets to zero carbon alternatives.

2.5.4 – Agriculture

Deliver substantial verifiable greenhouse gas abatement through adoption of a specified range of improvements in farming practice in line with recommendations from Teagasc. Deliver expansion of forestry planting and soil management to ensure that carbon abatement from land-use is delivered over the period 2021 to 2030 and in the years beyond. While much of this is outside the remit of planning, planning policies can support diversification within Agriculture and land use to develop sustainable and circular value chains and business models for lower carbon intensity farming. Planning policy can support the on farm building and infrastructural changes needed to support organic production, while landscape policies can help with protection and enhancement of biodiversity and water quality; and the production of bio-based products and bio energy through the Common Agricultural Policy and implementation of the National Policy Statement on the Bio economy.

2.5.5 – Enterprise and Services

Embed energy efficiency, replacement of fossil fuels, careful management of materials and waste, and carbon abatement across all enterprises and public service bodies. Mobilise clusters regionally and sectorally to become centres of excellence for the adoption of low carbon technologies. Planning for the delivery of quality employment and enterprise in the new areas of opportunity should be explored.

2.5.6 – Waste and the Circular Economy

Develop coherent reduction strategies for plastics, food waste, and resource use. Increase the level and the quality of recycling, with less contamination and greater replacement of new materials by recycling. Eliminate non-recyclable plastic. Reduce the reliance on landfill with sharp reductions in plastics and compostables entering landfill.

As part of the National Planning Framework (NPF) - Project Ireland 2040, the government established a Climate Action Fund, designed to stimulate innovation and pioneer efforts across Irish society. The first allocation of funds resulted in a return four times the contribution from the fund, and has supported the provision of over fifty high capacity charging points, over 60,000 homes on district heating, motor gas production from anaerobic digestion, and a nationwide LED lighting system.

The Climate Action Plan 2019 will ensure that the Climate Action Fund and the three other NPF funds, the rural and urban development funds and for disruptive innovation, are oriented towards supporting low-carbon initiatives.

The Southern Region Waste Management Plan (2015 – 2021) contains the policies for the management of waste in the southern region, in which Limerick is located. This plan and its successors will play an important part in providing the policy support for making the maximum use of waste in the region. This in turn could facilitate increased production of energy, e.g. through anaerobic digestion, the provision of nutrient rich material through composting and the increasing re-use and up-cycling of material that would previously been considered waste.

2.6 – Planning Guidance and Legislation

As the proposed Limerick Development Plan will operate in what has been referred to in the past as a hierarchy of plans, it is worth looking at the content of the plans that will in turn influence the content of the Development Plan.

2.6.1 – National Planning Framework

The National Planning Framework (NPF). Section 1.3 "Shared goals – Our National Strategic Outcomes" mentions on page 15 the Transition to a Low Carbon and Climate Resilient Society and correctly points out that this objective will "shape investment choices over the coming decades" which emphasises the long-term nature of the transition process. In section 9.2 of the NPF Resource Efficiency and Transition to a Low Carbon Economy, the policy objectives for achieving resource efficiency and the transition to low carbon economy are outlined.

National Policy Objective 53 has as its aim to "support the circular and bio-economy including in particular through greater efficiency in land management, greater use of renewable resources and by reducing the rate of land use change from urban sprawl and new development" (NPF, p. 118). The essential thrust of the NPF is how to "balance growth with more sustainable approaches to development and land use and to examine how planning policy can shape national infrastructural decisions" (NPF, p.119). Of all of the policies relating to resource and climate in the NPF, perhaps the most relevant is National Policy Objective 54, the aim of which is to "reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well targets for greenhouse gas emissions reductions". For the purposes of energy and the proposed Limerick Development Plan, this will mean updating the policy content of the plan in relation to renewables. The NPF goes onto emphasise the need to increase renewable sources of energy, sustainably manage waste streams and to ensure better water quality. The role of waste streams should be examined in order to determine which of these could contribute to energy generation through processes such as anaerobic digestion.

In pursuit of the NPF's NPO 3a, 3b & 3c, the Development Plan Core Strategy "should be accompanied by specific objectives setting out the achievement of urban infill/brownfield development" which recognises the long standing planning emphasis on concentration of development, which in the long run would lead to more easily serviced settlements and reduce the need for travel. What should also be remembered is that such development

patterns also increase the opportunities for district heating systems and the use of locally sourced renewable energy.

In addition National Policy Objective 3c of the NPF states its aim is to "deliver at least 30% of all new homes that are targeted in settlements other than the five Cities and their suburbs, within their existing built-up footprints" (NPF p.29). Again, this places further emphasis on the development of Limerick's urban structure and re-emphasises the importance of strengthening urban settlements throughout the Local Authority's functional area.

All of these above are echoed in the Regional Spatial and Economic Strategy for the Southern Region (RSES) where a similar commitment to a more sustainable approach to development is evident. In Regional Policy Objective 56 for instance it states that "the RSES recognises the urgency to transition to a low carbon future and it is therefore an objective to accelerate the transition towards low carbon economy and circular economy through mechanisms such as the Climate Action Competitive Fund" (RSES, p.116). Similarly Regional Policy Objective 58 states the following in relation to the bio-economy and Rural Areas "It is an objective to facilitate the development of the rural economy through supporting a sustainable and economically efficient agricultural and food sector, together with the bio-economy, subject to required environmental assessment processes where necessary…while at the same time noting the importance of maintaining and protecting the natural landscape".

Many established planning principles such as concentration of development would also have an effect on helping the transition to low carbon future and help with the adoption of renewable energy. In this too the RSES echoes the NPF, particularly in Regional Policy Objective 34;

"In pursuit of the NPF's NPO 3a, 3b & 3c, the Development Plan Core Strategy' should be accompanied by specific objectives setting out the achievement of urban infill/brownfield development.

• Seeking initiatives that enable site assembly for regeneration and initiatives that promote regeneration of brownfield lands over greenfield lands across all tiers of urban settlements including smaller towns and rural villages;

• Local Authorities through their respective County Development plans and Local Area Plans will set out policies and objectives to support the reuse/refurbishment of existing disused and derelict rural dwellings for residential purposes community or commercial (including social enterprise) and encourage new uses for disused/derelict farm buildings including residential where appropriate, subject to normal planning considerations and ensure that re-use is compatible with environmental and heritage protection;" (RSES, p. 96).

2.6.2 – Regional Spatial and Economic Strategy

The RSES also has polices that relate directly to energy infrastructure and renewable energy. These are reproduced below. One key aspect of renewables that will have to take into account is the Offshore Renewable Energy Development Plan which has been emerging since the preparation of the last Development Plan. It will be necessary for any off shore renewables to be supported from land and with Foynes, both Limerick and the region as a whole are ideally placed to carry out this function.

Regional Policy Objective 85: Renewable offshore energy seeks to promote regional cooperation in terms of offshore renewable energy development, environmental monitoring and awareness of the benefits of realising the Region's offshore energy potential. Initiatives arising from this objective shall be subject to robust feasibility and site selection, which includes explicit consideration of likely significant effects on European Sites and potential for adverse effects on the integrity of European sites in advance of any development.

Regional Policy Objective 95 Sustainable Renewable Energy Generation sets out that it is an objective to support implementation of the National Renewable Energy Action Plan (NREAP), and the Offshore Renewable Energy Plan and the implementation of mitigation measures outlined in their respective SEA and AA and leverage the Region as a leader and innovator in sustainable renewable energy generation.

Regional Policy Objective 96 Integrating Renewable Energy Sources states that it is an objective to support the sustainable development, maintenance and upgrading of electricity and gas network grid infrastructure to integrate a renewable energy sources and ensure our national and regional energy system remains safe, secure and ready to meet increased demand as the regional economy grows.

Regional Policy Objective 99 – Renewable Wind Energy: It is an objective to support the sustainable development of renewable wind energy (on shore and off shore) at appropriate locations and related grid infrastructure in the Region in compliance with national Wind Energy Guidelines.

Regional Policy Objective 100 – Indigenous Renewable Energy Production and Grid Injection It is an objective to support the integration of indigenous renewable energy production and grid injection.

Regional Policy Objective 104 – Energy Storage and Carbon Capture - It is an objective to support investment in initiatives to develop innovation, advances in technology and pilot projects for the sustainable development of energy storage and carbon capture within the Region and to work with key stakeholders in developing sustainable forestry, including initiatives for native tree planting and better management of peat land and soil management to support carbon sequestration and enhancement of biodiversity

In Regional Planning Objective (RPO) 119 New Energy Infrastructure - it is stated that; It is an objective to support the sustainable reinforcement and provision of new energy infrastructure by infrastructure providers (subject to appropriate environmental assessment and the planning process) to ensure the energy needs of future population and economic expansion within designated growth areas and across the Region can be delivered in a sustainable and timely manner and that capacity is available at local and regional scale to meet future needs.

Regional Policy Objective 222 Renewable Energy Generation and Transmission Network sets out that:

a. Local Authority City and County Development Plans shall support the sustainable development of renewable energy generation and demand centres such as data centres which can be serviced with a renewable energy source (subject to appropriate environmental

assessment and the planning process) to spatially suitable locations to ensure efficient use of the existing transmission network;

b. The RSES supports strengthened and sustainable local/community renewable energy networks, micro renewable generation, climate smart countryside projects and connections from such initiatives to the grid. The potential for sustainable local/community energy projects and micro generation to both mitigate climate change and to reduce fuel poverty is also supported;

c. The RSES supports the Southern Region as a Carbon Neutral Energy Region.

Regional Policy Objective 224 states the following:

Delivery of Energy Networks Local Authorities shall work in partnership with existing service providers to facilitate required enhancement and upgrading of existing infrastructure and networks (subject to appropriate environmental assessment and the planning process) and support the safeguarding of strategic energy corridors from encroachment by other developments that could compromise the delivery of energy networks.

As can be seen from above there is a comprehensive range of guidance and legislation, which will inform policies that will guide the transition to a low carbon future. In the chapter that follows the implications of this will be considered under different headings and reference will be made to planning guidance and legislation in particular as it relates to the various land use topics being discussed. In relation to Sections 28 guidelines, the only ones that relate specifically to renewable energy are the Wind Energy Guidance from 2006. These are currently being updated and are likely to be in place, prior to the publication of the draft Limerick Development Plan 2022 – 2028.

2.7 – Existing Renewable Infrastructure

2.7.1 – Wind Energy

The most important part of renewable infrastructure is, of course, that which produces the energy itself. In Limerick the most widespread of these are wind farms. Table 1 below shows the wind farms in Limerick, the date to which they connected to the grid and their output.

Wind farm	**Connection to Grid**	**Output (MW)**
Athea	2014	34.35
Ballagh	2016	2.3
Carrons	2010	4.6
Dromada	2009	28.5
Garracummer	2015	1.0
Dromdeveen	2011	27.5
Grouselodge	2011	15.0
Kilmeedy	2010	4.7
Knockastanna	2009	7.5
Knockawarriga	2008	22.5
Mauricetown	2019	13.8
Rathcahill	2011	12.5
Slievereagh	2011	2.5
Tournafulla	2007	27.0
Vistakon, Castletroy	2017	2.0
Total Output		**205.75MW**

Table 1: Wind farms in Limerick with output and connection dates – Source: Limerick City and County Council

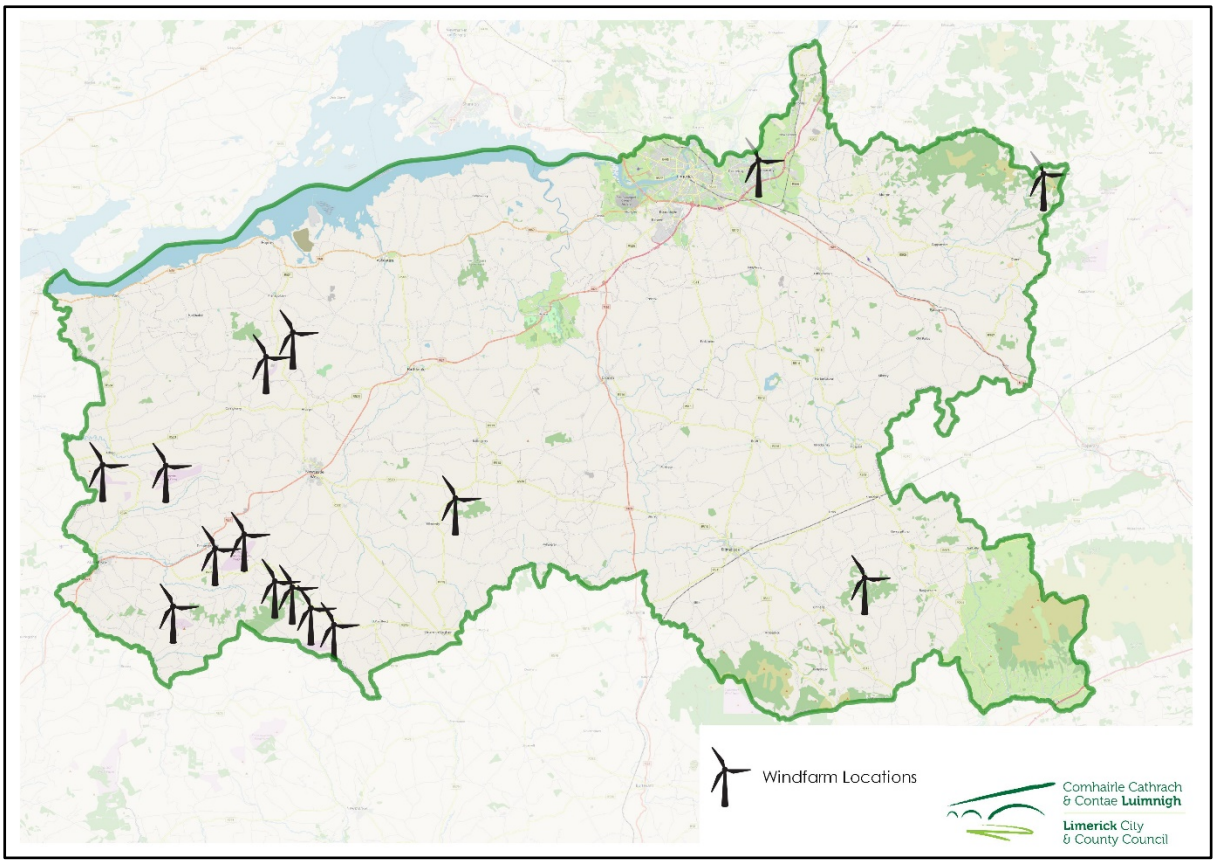

Figure 3 – Location of Windfarms in Limerick

2.7.2 – Solar Energy Developments

Development in technology has seen a significant increase in the development of solar energy production, however unlike wind farms, none have yet been constructed. The National Planning Framework refers to "new energy and transmission grids will be necessary for a more renewable focussed energy generations system" but this will need to extend also to a distribution and service network.

Planning Reference and Location	Status	Potential Output (MW)
16/619 – Newcastle West	Granted	11.5
16/900 – Annacotty	Granted	5.0
16/957 – Lisnagry	Granted	4.0
17/326 – Kilmallock	Granted	11.5
17/396 – Cappamore	Granted	5.0
17/750 – Cappamore	Granted	5.6
17/807 – Foynes	Withdrawn	
17/1174 – Foynes	Granted	10.34
17/1220 – Foynes	Granted	23.0
18/85 – Patrickswell	Withdrawn	
18/215 – Mungret	Granted	5.2
18/470 – Patrickswell	Withdrawn	
18/679 – Kilmallock	Granted.	6.0
19/9 – Garryspillane	Refused	
19/18 – Shanagolden	Granted	21.35
19/782 – Abbeyfeale	Granted	5.0
Total Potential Output		**113.49MW**

Table 2 – Solar farms which have sought planning permission in Limerick to date (June 2020)
Source: Limerick City and County Council

2.7.3 – Other Energy Production Sources

The Gas Networks Ireland network will also have a role to play in helping with the transition locally produced energy in that it could take connections from locally based gas production systems, which would contribute gas to the grid. There will be technical issues to be solved before this can take place, not least that of gas quality and cleanliness, but it is likely that such local systems will play a part in not just energy production but also economic diversification.

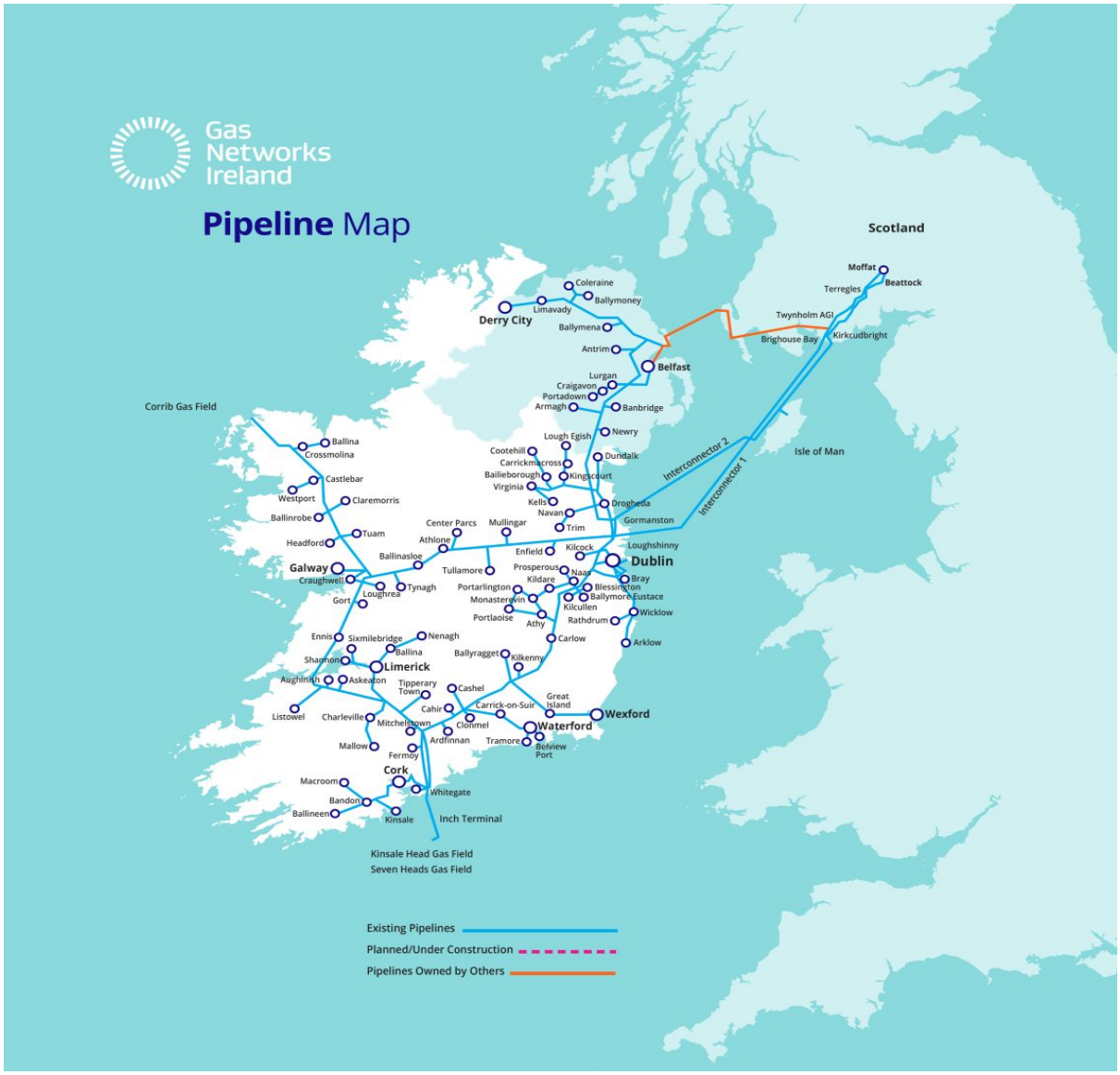

Figure 3 – Gas Networks Ireland Gas Pipelines

There are two Anaerobic Digesters (AD) in operation in Limerick, one located close to Shanagolden, which uses poultry and cattle waste in addition to other imported material as feedstock and a second at Bunlicky wastewater treatment plant. There is one hydro plant is located and in operation close to Croom. Limerick City and County Council operates a Combined Heat and Power Plant at the Gortadroma landfill in West Limerick with a capacity of 1 MW.

Figure 4 – Combined heat and power unit of the type in operation at Gortadroma

2.8 – Conclusion

Managing the move to a successful renewable energy future means investing more in clean energy transition-related technologies, as well as moving towards more sustainable and perhaps localised modes of energy production and consumption. It also requires careful research to make sure that the steps taken are the correct ones and are ultimately cost effective. The proposed Limerick Development Plan 2022 - 2028 needs to continue to support investment in sustainable energy production and infrastructure provision in Limerick to meet local and national needs.

3.0 – Climate Change and Flooding

3.1 – Introduction

The issue of climate change and flooding is a complex subject, with implications for both human health, the environment, land use planning and the landscape. Many different sectors (e.g. land use planning, agriculture and forestry) exert an influence on water and flooding patterns and there is often difficulty in determining the exact influence of each. The concentration in this paper is, of course, on land use planning and the implications of flooding for the policy content of the proposed Limerick Development Plan 2022 – 2028.

The section is structured as follows; the introduction is followed by a section on legislation and policy, which lays out the statutory and guidance background from EU to national and regional level. Section two considers housing and sustainable surface water management.. The final section acts as a summary and outlines the important issues that will influence the plan review.

3.2 – Legislation and Policy Context

The objective of the Floods Directive (2007/60/EC) is to establish a framework for the assessment and management of flood risks to reduce the negative consequences of flooding on human health, economic activities, the environment and cultural heritage in the European Union. The aim of the EU 'Floods' Directive, which came into force in 2007, is to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The Directive requires Member States to undertake three key steps of analysis and planning:

- The Preliminary Flood Risk Assessment (FRA) - A screening of flood risk to identify Areas of Potentially Significant Flood Risk (APSFRs), which were referred to as Areas for further Assessment (AFAs) for the National CFRAM Programme. The PFRA is a preliminary assessment, based on available or readily-derivable information;
- The Flood Maps: The preparation of flood hazard and risk maps for the APSFRs;
- The Flood Risk Management Plans (FRMPs): The preparation of plans setting out objectives and a set of measures aimed at the management and reduction of flood risk within the APSFRs.

In undertaking these three key steps, the Directive also requires Member States to exchange information and coordinate across borders, to coordinate with the implementation of the Water Framework Directive (WFD) and to publish the PFRA and Maps and encourage the active involvement of interested parties in the preparation of the FRMPs.

The **Water Framework Directive** is linked to a number of other EU directives in several ways. These include Directives relating to the protection of biodiversity (Birds and Habitats Directives), directives related to specific uses of waters (drinking water, bathing waters and urban waste water directives) and to directives concerned with the regulation of activities undertaken in the environment (Industrial Emissions and Environmental Impact Assessment directives). More recent directives on topics such as Floods and the Marine Strategy Framework have significant linkages. These linkages will become stronger with the preparation of Marine Spatial Plans.

Arterial Drainage Amendment Act (1995) - Arterial Drainage Schemes were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. Rivers, lakes weirs and bridges were modified to enhance conveyance, embankments were built to control the movement of floodwater and various other works was carried out under Part II of the Arterial Drainage Act, 1945. The purpose of the schemes was to improve land for agriculture, to ensure that the 3-year flood was retained in bank this was achieved by lowering water levels during the growing season to reduce water logging on the land beside watercourses known as callow. Flood protection in the benefiting lands was increased as a result of the Arterial Drainage Schemes.

3.2.1 – Section 28 Guidelines

The **Planning System and Flood Risk Management**. **Guidelines** for Planning Authorities (November 2009).

These guidelines require the planning system at national, regional and local levels to:

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The Guidelines were issued to planning authorities and An Bord Pleanála under Section 28 of the Planning and Development Act 2000 (as amended), which requires them to have proper regard to the principles and procedures of these guidelines in carrying out their functions.

In simple terms the guidance design Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types or levels of flood zones defined for the purposes of these Guidelines: Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding); Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan, which are not in zones A or B.

3.2.2 – National Planning Framework (NPF)

Policy headings in the NPF are referred to as National Policy Objectives (NPOs). Two of the most important of those that relate to flooding are reproduced below.

National Policy Objective 41b: In line with the collective aims of national policy regarding climate adaptation, to address the effects of sea level changes and coastal flooding and erosion and to support the implementation of adaptation responses in vulnerable areas.

National Policy Objective 57: Enhance water quality and resource management by: Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities. Ensuring that River Basin Management Plan for Ireland (2017-2021) objectives is fully considered throughout the physical planning process. Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places.

3.2.3 – Regional Spatial and Economic Strategy

Flood Risk Management Objectives are an important part of the policy content of the RSES. Some of the most important are indicated below:

Regional Policy Objective 114 states the following:

It is an objective to:

a. Ensure that the flood risk management objectives of the Flood Risk Management Plans are fully considered in the development of planning policy and decision-making by local authorities so that flood risk is a key driver in the identification of suitable locations for new development, considering the CFRAM flood maps and other flood maps as available.

b. Ensure that developments in upland areas, such as wind farm developments, roadway construction, peat land drainage and forestry proposals, provide sufficient storm water attenuation to avoid the occurrence of river erosion or flooding downstream subject to hydrological and ground/peat stability assessments.

Regional Policy Objective 116 - Planning System and Flood Risk Management: Consideration must be given to future appropriate land-use policies in accordance with the requirements of the Guidelines, The Planning System and Flood Risk Management 2009. Strategic and local flood risk assessments and plans should be prepared where appropriate, which should include consideration of potential impacts of flood risk arising from climate change. It is an objective to avoid inappropriate development in areas at risk of flooding and integrate sustainable water management solutions (such as SUDS, non-porous surfacing and green roofs) to create safe places in accordance with the Guidelines.

Regional Policy Objective 117 - Flood Risk Management and Biodiversity: It is an objective to avail of opportunities to enhance biodiversity and amenity and to ensure the protection of environmentally sensitive sites and habitats, including where flood risk management measures are planned. Plans and projects that have the potential to negatively impact on Nature 2000 sites are subject to the requirements of the Habitats Directive.

Regional Policy Objective 119: Flood Relief Schemes It is an objective to:

a. Support investment in the sustainable development of Strategic Investment Priorities under the National Development Plan 2018-27 and to ensure that flood risk assessment for all strategic infrastructure developments is future-proofed to consider potential impacts of climate change;

b. Support investment in subsequent projects by capital spending agencies to deliver flood relief schemes under the National Strategic Outcome, Transition to a Low Carbon and Climate Resilient Society. Such projects should be future proofed for adaptation to consider potential impacts of climate change.

c. Ensure that all Infrastructure and energy providers/operators provide for adaptation measures to protect strategic infrastructure (including roads, railways, ports and energy infrastructure) from increased flood risk associated with climate change.

Regional Policy Objective 120: Flooding and Coastal Erosion It is an objective to support measures (including Integrated Coastal Zone Management) for the management and protection of coastal resources and communities against coastal erosion, flooding and other threats. Statutory land use plans shall take account of the risk of coastal erosion.

Regional Policy Objective 124 – Green Infrastructure sets out the following:

a. It is an objective to promote the concept of connecting corridors for the movement of wildlife and encourage the retention and creation of features of biodiversity value, ecological corridors and networks that connect areas of high conservation value such as woodlands, hedgerows, earth banks, watercourses and wetlands. The RSES recognises the necessity of protecting such corridors and the necessity to encourage the management of features of the landscape that support the Natura 2000 network;

b. Green infrastructure will be integrated into the preparation of statutory land-use plans in the Region, which will include identifying Green infrastructure and strengthening this network;

c. All Development Plans and Local Area Plans shall protect, enhance, provide and manage Green infrastructure in an integrated and coherent manner addressing the themes of biodiversity protection, water management and climate action; and should also have regard to the required targets in relation to the conservation of European sites, other nature conservation sites, ecological networks, and protected species;

d. Any future development of greenways, blueways, peatways, cycleways or walkways will include an assessment by the relevant authorities of any impacts that may arise from increased visitor pressures, in particular, on sensitive European sites and the design of the network will consider the provision of protective measures on sites sensitive to disturbance/visitor pressure.

3.2.4 - Development Plan Guidelines (2007) states the following:

Development plan policies dealing with flooding also need to recognise that under Part 1 of the First Schedule to the Planning and Development Act 2000 (as amended), the purposes for which objectives may be indicated in development plans include regulating, restricting or controlling development in areas at risk of flooding (whether inland or coastal), erosion and other natural hazards. In identifying lands for various categories of development, flood risk should be considered at relevant stages of the planning and development processes. The planning system should help to ensure that existing flood risks are either reduced or addressed and that new development does not individually or cumulatively give rise to new flood risks, uncertainties inherent in the prediction of flooding and the fact that flood risk is expected to increase as a result of climate change. In this regard, a precautionary approach is desirable.

3.2.5 – Limerick City and County Council Climate Change Adaptation Strategy (CCAS)

There are a number of objectives and actions in the CCAS, which are relevant to planning. One of these, for example relates to Objective 4.1 of the Limerick Climate Change Adaptation Strategy states the following, which emphasises the importance of surface water management:

- Update policy content to ensure that drainage design standards and guidelines that are being employed are the most technically up to date and have suitable allowances for climate change**;**
- Provide training and guidance on sustainable urban drainage techniques**.**

3.2.6 – Implications of Flood Management issues for the proposed Limerick Development Plan 2022 – 2028

Action 4.1 of the Limerick Climate Change Adaptation Strategy sums up the situation, when it states that it is an objective to "integrate Climate Change Adaptation Planning into all plans, strategies and policies prepared by the Council, including Development Plans, Local Area Plans, Master plans, Transportation Plans, Tourism and Economic Plans". Flood management policies are adaptation actions, as they help society deal with one of the effects of climate change. As flooding poses a threat to many aspects of activity governed by land use planning, a broader policy response than that which had existed before is now required.

3.2.7 – Strategic Flood Risk Assessment for the propsoed Limerick Development Plan 2022 – 2028

Flooding occurs frequently across the City and County of Limerick. There are elements of Fluvial, Pluvial, Coastal and Groundwater flooding that occur in the City and County and sometimes in certain situations, elements of all of these occur simultaneously. A Strategic Flood Risk Assessment (SFRA), as required by 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DEHLG and OPW, 2009), will be carried out alongside the preparation of the Strategic Environmental Assessment and will inform the propsoed development plan process. The SFRA will focus on land use zoning provided for by the proposed Limerick Development Plan. The SFRA will consider available and emerging information on flood risk indicators, including the OPW's Flood Hazard and Risk Mapping, the already existing CFRAMs and individual site-specific flood risk assessments submitted to the

Development Management process and any flood defences and inter-County interactions. The SFRA will strongly influence the policy content of the proposed developemnt plan.

Figure 5 – Implications of flooding for land usage, in urban areas

The role of potential flood residence areas in helping to provide cost effective solutions to flooding problems is one way of helping to deal with the issue of flooding. The utility of such areas as habitats and green infrastructure resources is also a factor to be considered in that the River Shannon and its tributaries in Limerick are part of the Lower River Shannon Special Area of Conservation site. Flood residence areas have a valuable role to play in providing a buffer for the main river channel in addition to being valuable habitats in their own right.

The use of SUDS mechanisms will be one of the responses to climate change issues in that it is through such measures that flooding, currently seen as one of the major effects of climate change, can be alleviated. There will be a need for further adaptation of strategies in the future and the Council will, where necessary and appropriate, put these measures in place.

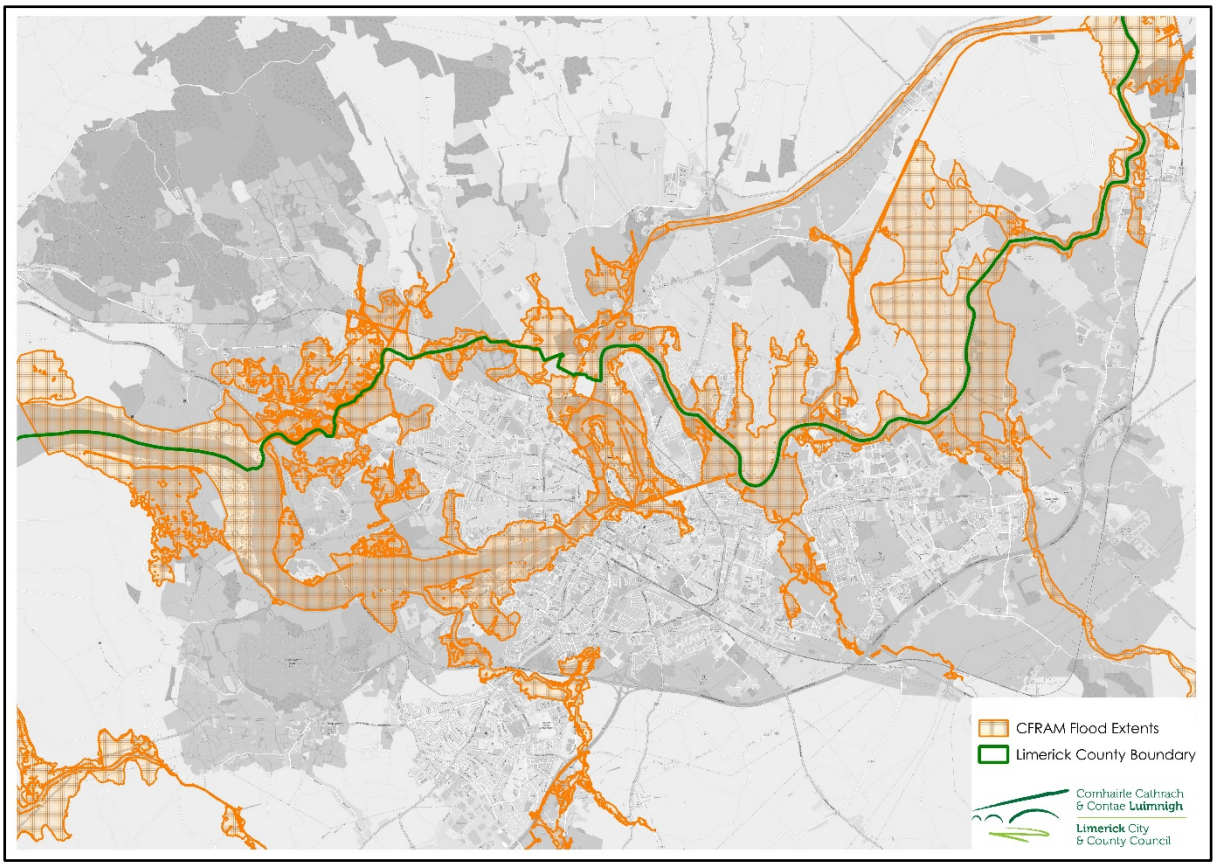

Figure 6 – CFRAM Data – Extents of Flooding in the City and Environs

3.3 – Housing and Settlement Strategy

Housing is regarded as being amongst the vulnerable of land uses, where flooding is concerned. In this situation, the new plan will follow the guidance outlined in the flooding guidelines. The Planning System and Flood Risk Management Guidelines are a comprehensive statement of good planning practice and a very important step towards adapting to the inevitable impacts of climate change. The impacts of climate change will increase in the coming decades and are likely to be felt in every sector of the economy. Increased frequency and magnitude of flooding due to heavier rainfall, sea level rises and storm surges are among the most serious threats for Ireland. Addressing flood risk identification, assessment and management through the planning system in these guidelines is a key response. The Local Authority will consider the recommendation of the SFRA in relation to lands suitable for residential development.

3.4 – Sustainable Urban Drainage Systems

Surface water drainage design in the past has been extremely simple using a rational method to size pipes to ensure that surface water is removed as quickly as possible to ensure flooding does not take place. In recent years there has been a shift from the traditional method of moving water downstream, which has the potential for flooding of other areas subject to the capacity further down the system.

The use of Sustainable Urban Drainage Systems has been developed, as a alternative and more sustainable means of surface water disposal, which can best be summarised as offering

a total solution to rainwater management while traditional drainage can be considered as only providing a collection and disposal approach. Limerick City and County Council is committed to working with developers to deliver sustainable means of surface water disposal, while promoting opportunities for biodiversity and amenities for its citizens.

SUDs features, such as rain gardens, attenuate storm flows which relieves pressure on the storm sewer network. In so doing, they can reduce the need for costly investment in drainage network upgrades for developers and the Local Authority.

3.5 – Conclusion

Specific recommendations on the possible effects of climate change and the allowances to be provided for future flood risk management in Ireland shall be considered in the preparation of the proposed Development Plan 2022 – 2028. The Strategic Flood Risk Assessment will be prepared in accordance with the relevant guidelines and shall inform the contents of the planning policy.

4.0 – Transition to a Low Carbon Economy

4.1 – Introduction

The transition to a low carbon economy is a complex subject with implications for the whole of society and its entire range of economic activities. Many different sectors will approach it from their own view point and many, like agriculture and forestry, largely lie outside the scope of planning legislation. What follows therefore is not a commentary on the transition to low carbon economy as a whole, but a summary of the implications of such a transition for Irish Planning and Land Use guidance, specifically that of the review of the Limerick Development Plan.

The paper is structured as follows; the introduction is followed by a section on legislation and policy, which lays out the statutory and guidance background from EU to national and regional level. Section two deals with the key issues arising with the low carbon transition. While energy is an important, part of the transition to a low carbon economy and is mentioned in this paper above.

Much of what will follow in section 2 will be seen to be closely related to basic planning principles, as many of these, such as careful reuse of older buildings, infill development, and concentration of development, including the use of brown field sites all play their part in reducing carbon emissions and maximising the use of existing resources.

4.2 – Legislation and Policy

4.2.1 – International and European Context

The United Nations Framework Convention on Climate Change (UNFCCC), 2014 is the international legal framework for addressing climate change at a global level. The policy context outlined above, in terms of International and European context is also the relevant policy context for the transition to a low carbon economy.

4.2.2 – National Context

At national level, the National Policy Position on Climate Action and Low Carbon Development (2014) sets out the national objective of achieving a transition to a low carbon economy. This was given legislative effect by the Climate Action and Low Carbon Act 2015.The Act provided for the development of a National Adaptation Framework (NAF), which was published in December 2017. The NAF required sectoral and local adaptation strategies, which were prepared in 2019. The NAF identifies 12 key sectors in seven Government departments, where Adaptation Strategies have to be prepared. Table 1 below indicates the different sectors.

Sector	Parent Department
Seafood	Department of Agriculture, Food and the Marine
Agriculture	Department of Agriculture, Food and the Marine
Forestry	Department of Agriculture, Food and the Marine
Biodiversity	Department of Culture, Heritage and the Gaeltacht
Built and Archaeological Heritage	Department of Culture, Heritage and the Gaeltacht
Transport Infrastructure	Department of Transport, Tourism and Sport
Electricity and Gas Networks	Department of Communications, Climate Action and Environment
Communications networks	Department of Communications, Climate Action and Environment
Flood Risk Management	Office of Public Works
Water Quality	Department of Housing, Planning and Local Government
Water Services Infrastructure	Department of Housing, Planning and Local Government
Health	Department of Health

Table 3 – Sectoral Adaptation Strategies – Sectors and Parent Departments - Source: Department of Communications, Climate Action and Environment

Each local authority was required to develop a Climate Adaptation Strategy for the period 2019 – 2024. Local strategies will "be used to inform development plans and other statutory plans and policies of the Local Authority."(Department of Communications, Climate Action and Environment 2018, p.7).The Limerick Climate Change Adaptation Strategy was adopted in July 2019.

4.3 – Key issues for consideration in the transition to a Low Carbon Economy

The low carbon transition implications for the proposed Limerick Development Plan, cross cutting through almost all sectors of society and future proofing all policies to ensure that they contribute to achieving the transition will be critical in the environmental assessments, which will be required, in the plan preparation process.

- The OECD in 2015 (Aligning Policies for a Low carbon Economy, p.17) mentions the need for strengthening initiatives for "sustainable land use". Both the NPF and the RSES places this on a policy footing rather than offering incentives but it is worth remembering that as carbon budgeting and carbon pricing further evolves that the move towards sustainable land use would be rewarded by financial incentives. The National Planning Framework in Section 11.3 "Alternatives to Business as Usual"

mentions the challenge of accommodating “projected growth in the most optimal and sustainable manner that would achieve Irelands economic, social and environmental requirements” and the transition will require a different way of looking at economic development.

The transition is likely to pose problems for some older sectors of the economy (e.g. intensive fossil fuel users) and for elements of our settlement strategy, where infrastructure will have to be provided to ensure concentrated development. In situations such as these, it is important to remember that supports outside of planning, such as financial mechanisms (e.g. low cost loans) will be necessary to achieve an equitable transition. By this, it is intended that the efforts should be made to ease the effects of the low carbon transition for the most vulnerable in society to ensure a more equitable transition.

Agriculture and forestry will have a huge role to play in the transition process. Policy content needs to be updated to reflect the fact that new infrastructure and supports will be required to help make the transition to low carbon agricultural model. Anaerobic digestion for example has the potential to contribute to sustainable energy production, while at the same time producing an easily handled source of fertiliser with a predictable nutrient content. This, when used as part of agricultural nutrient management planning can make contribution to reducing energy intensive inputs. This would have implications for the gas network, which is mentioned in the next section.

- Over the last decade, technology such as that of the electric car has become more common and mainstream. This, of course leads to increased demand for support infrastructure such as charging points. The National Planning Framework highlights “new energy and transmission grids will be necessary for a more renewable focussed energy generations system” but this will need to extend also to a distribution and service network. Railways too will require additional policy support, in the short term to help increase their efficiency such as closing level crossings or allowing their automation and in the longer term allowing work for their eventual electrification. Recent planning applications by Iarnrod Eireann (in January and February) this year brought this requirement into focus as the organisation sought to prepare its railway infrastructure for the future.

- The Gas Networks Ireland network will also have a role to play in helping with the transition to low carbon future in that it could take connections from locally based gas production systems, which would contribute gas to the grid. There will be technical issues to be solved before this can take place, not least that of gas quality and cleanliness, but it is likely that such local systems will play a part in not just energy production but also economic diversification.
  More common forms of infrastructure such as roads will also suffer from the effects of climate change. The Atlantic Seaboard South CARO has recently published a Local Authority Guidance note on Climate Adaptation for Roads, in which the risks to roads from differing climate events is outlined and possible responses suggested. This is of course raises the question of climate proofing the infrastructure on which modern

society depends and the policy content of the plan would need to be updated to take this into account.

- In considering heritage, it should be remembered that it takes different forms, one being our natural heritage and the other our built and archaeological heritage. In many cases it is easy to take it for granted because we are surrounded by it and by extension we can forget the effects climate change can have on heritage and how aspects of heritage itself can help in dealing with the effects of climate change. Heritage in Ireland ranges from the many smaller sites of local and regional importance to those of national and global significance. It includes dwellings commercial and public buildings, national monuments, underwater and buried archaeology and their physical and cultural settings. The direct effects of climate change on heritage may be immediate or cumulative. Damage from catastrophic weather events such as floods and storms is likely to increase at the same time as slow onset environmental-deterioration from a changing environment. The way these effects manifest will vary according to the sensitivity of the site and its level of exposure. Coastal and Estuarine sites would be particularly vulnerable.

- There will also be indirect impacts arising from societal responses to climate change in terms of both adaptation (e.g. changes in land use, such as construction of flood defences or use of land as flood residence areas) and mitigation (e.g. the retrofitting of historic buildings to reduce energy consumption). Of the many potential impacts, those identified as priorities for heritage adaptation planning are flooding (inland and coastal), storm damage, coastal erosion, soil movement (landslip or erosion), pests and mould, wildfires and mal-adaptation. By the last is meant poorly thought adaptation actions, which ultimately prove to be not for purpose. This might include unsuitable adaptations to historic buildings.

- Irish biodiversity is vulnerable to the impacts of climate change, but also has a key role to play in establishing an adaptive capacity and a mitigation response. The declaration of a climate change and biodiversity emergency by Dáil Éireann in May 2019 recognizes the importance of combined action on both of these crises. The Citizens Assembly on climate change, the report for the Joint Oireachtas Committee on Climate Action and the government's Climate Action Plan seek to address the emergency and increase Ireland's ability to respond with appropriate climate action. Climate change has major indirect impacts on Irish biodiversity through its interaction with other stressors, in particular habitat fragmentation and loss; over-exploitation; pollution of air, water and soil; and the spread of invasive species. This Biodiversity Sectoral Climate Change Adaptation Plan considers terrestrial, freshwater and marine biodiversity and ecosystem systems. The purpose of the Bio-diversity Climate Adaption Strategy is to identify adaptation options that will help to protect biodiversity and ecosystems from the impacts of changing climate and to enable ecosystems to play their role in increasing resilience to climate change.

Figure 7 – Otters (*Lutra lutra*), will be vulnerable to the effects of Climate Change

- In a Limerick context, the biggest challenge may be addressing displacement in the agriculture sector. There is a commitment to deliver carbon neutrality in the agriculture and land-use sector by the year 2050. What this means for the sector and the workforce remains unclear. In Brussels, discussions are ongoing regarding the future of the Common Agriculture Policy post 2022. A tightening of environmental legislation or CAP requirements could put pressure on some farms. Teagasc's 2017 National Farm Survey indicates that already 40% of cattle rearing farms and 40% of sheep farms are 'economically vulnerable' and a push towards carbon reduction allied to changing consumer tastes could pose problems for those marginal farms. However there may be a silver lining, reduction in intensity and a move towards higher value produce could help sustain family farms. As of yet it will be difficult to predict exactly what will happen, though if the trends of the last 50 years continue; it is likely that there will continue to be a move away from agriculture.

- The emphasis on infill and brown field development by both the NPF and the RSES will help to deliver more compact urban forms over their lifetime. Such compact development forms will help the transition to district heating schemes, which have been a feature of urban developments in Europe for a long time now. However, what is also needed is change in incentives to encourage the retro-fitting of energy saving measures to older housing stock, as indicated much of the housing stock particularly in rural settlements dates from the 19th and early 20th centuries. Building regulations have gradually driven new home construction in this direction. They require new homes to have some element of renewables, either through a combination of a gas/oil boiler and solar panels or a heat pump instead of a boiler. The heat pump works out at a similar cost to a combined gas and solar system, so there is no resulting impact on the build cost of new homes. More than 50 per cent of new homes constructed in 2019 have adopted heat pumps (Irish Times October 16th 2019).

Figure 8 – Air to water heat pump for Domestic Purposes

4.4 – Conclusion

Managing a successful low carbon transition means investing more in clean energy transition-related technologies, as well as moving towards more sustainable and perhaps localised modes of production and consumption. One of the key challenges for the climate-neutral transition is to reallocate resources from carbon-intensive to climate-neutral developments and infrastructure. Regions in low carbon transition are often home to economic and manufacturing industries with high environmental impact. Successful economic modernisation requires stimulating local economic diversification towards clean industries through decarbonisation, innovation and digitalisation. Many regions undergoing industrial transition recognise the societal and business value of good environmental goals and the low-carbon transition is often part of this. Such transitions are complex, and obstacles arise.

Regions in low carbon transition often face difficulties in stimulating investment in green innovation, particularly among local firms. Transitions can be eased by the inclusion of appropriate policy content in the plan, which would facilitate the necessary infrastructural changes to achieve low carbon targets.

Established interests can be an additional barrier in regions in low carbon transition, particularly in those with long-established industries that can hamper the development of new industrial growth paths. However, without the active commitment of leading industry to

transition to clean energy production, public authorities might not have the financial means and capacity to facilitate investment in the infrastructure necessary to modernise production and speed-up technology adoption among consumers (e.g. providing charging stations for e-vehicles). In addition, a large range of stakeholders needs to be involved in transition planning in order to make the transition successful. Historically, the development strategies that showed greater political resilience and a more coherent and comprehensive approach were those where a relative consensus was reached on common aims. The consultation process of the proposed Limerick Development Plan can play key role in encouraging public debate as part of this consensus.