



Topic Paper: Building Environmental Resilience

Local Development Plan 2020-2035



Belfast
City Council

Executive Summary

Context

The purpose of the planning system is to secure the orderly and consistent development of land to facilitate sustainable patterns of growth and development whilst protecting and, where appropriate enhancing the natural and man-made environment. The Regional Development Strategy (RDS) seeks to “strengthen Belfast as the regional economic driver” as one of its 8 key aims, recognising that “successful regions have strong and vibrant cities at their core” and that “Belfast drives much of the economic growth and shares its wealth across the Region”.

Environmental change presents a key challenge for Belfast with potential impacts on the built and natural environment, the people and the economy. Climate change projections for the City indicate an increase in temperature and autumn and winter rainfall, with more episodes of heavy rainfall and extreme temperatures presenting a risk for people, property, infrastructure, habitats and species. The UK Government’s commitment to tackling climate change is set out in the Climate Change Act. This legislation has put in place targets to reduce greenhouse gas emissions 80% by 2050, ensuring UK plays its role in reducing emissions and is prepared for and resilient to the impacts of climate change. Northern Ireland has emission reduction targets set by the Northern Ireland Executive in the PfG. Through planning there is the opportunity to both help to mitigate the impacts of climate change and ensure that we are in a position to adapt to the impacts of future climate change.

Mitigation – to slow down human induced environmental change by reducing the amount of greenhouse gases in the atmosphere.

The RDS recommends that the planning system should contribute to reducing greenhouse gas emissions to mitigate environmental change. There is a need to reduce energy consumption and support the development of renewable energy generating technologies, encouraging opportunities for decentralised and local renewable or low carbon sources of heat and power, where possible. It will be important that the Local Development Plan responds to these issues. The Local Development Plan spatial strategy should be based on sustainable planning principles seeking to minimise greenhouse gas emissions by creating sustainable communities that focus on sustainable travel and seek to minimise the use of land and resources.

Adaptation – measures to adapt to our changing environment. Predictions are for warmer and wetter winters, hotter and drier summers, rising sea levels and increased extreme weather conditions.

The predicted climate changes will result in an increased risk of flood events and more severe flood events. Flooding has the potential to affect public safety, and disrupt day-to-day life. The LDP will provide an important opportunity to take a long term, catchment focused, approach to flood risk. There is the potential opportunity to facilitate the development of a green and blue infrastructure network in the urban area that could play an important role in adapting to the impacts of environmental change.

Evidence Base	Social, Economic & Environmental Factors
<ul style="list-style-type: none"> • Power represents the second largest source of emissions in Northern Ireland; the majority of emissions are due to the use of natural gas in power generation for the domestic market. • Vehicle emissions per capita are higher in Northern Ireland than in the UK as a whole reflecting relatively dispersed population and reliance on private cars for commuting rather than public transport. • Belfast has four air quality management areas due to high traffic volumes on key arterial routes into the City. • GHG emissions are higher in Northern Ireland than in the UK as a whole, reflecting widespread reliance on oil and coal for heating in the domestic sector. • The majority of households are largely reliant on oil, as the main fuel source for heating. This is a factor in the extreme levels of fuel poverty in Belfast. • NI has renewable electricity and heat targets, to reduce dependence on fossil fuels thereby reducing GHG emissions. 	<ul style="list-style-type: none"> • LDP could incorporate measures such as use of public transport, eco-driving and development of cycling infrastructure, plus preparing for electric vehicles. Changing travel behaviour is one of the main levers to influence emission reductions from transport. • Consider the opportunity to incorporate an integrated blue and green infrastructure network to adapt to environmental change and mitigate flood risks. This would provide space for recreation, sustainable urban drainage systems, and wildlife corridors. • Facilitate the expansion of renewable energy use in Belfast through decentralised energy generation, community energy schemes and district heating to reduce GHG emissions. • Promote the design of energy efficient buildings to reduce GHG emissions and reduce fuel poverty.
	<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • The main opportunity for abatement in Northern Ireland is likely to be in renewable power generation, both as regards to wind and solar at present: • There is also scope to consider policies which further encourage community and locally-owned energy projects • Green and Blue Infrastructure Network to mitigate flood risk and provide urban cooling.

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1.0 Introduction

Purpose of this document

- 1.1. This is one of a series of 17 topic papers which have been put together to inform the Sustainability Appraisal Scoping Report for the Belfast Local Development Plan (LDP).
- 1.2. Each topic paper provides a summary of the evidence base required for the Sustainability Appraisal, Preferred Options Paper and Local Development Plan. They establish a baseline position and identify the key issues that need to be addressed.
- 1.3. By combining the evidence gathering stages for both the Sustainability Appraisal and Local Development Plan, we aim to streamline the documentation produced and avoid duplication. It will also help to ensure that sustainable development is embedded in the planning process and that sustainability appraisal is one of the main drivers informing the preparation of the Local Development Plan.
- 1.4. Each topic paper can be read separately but, inevitably, there are important related matters in other topic papers and background evidence.
- 1.5. The purpose of the planning system is to secure the orderly and consistent development of land to facilitate sustainable patterns of growth and development whilst protecting and, where appropriate enhancing the natural and man-made environment. To achieve this aim it is essential that the development needs of society are properly identified.

Member Workshops

- 1.6. A series of 17 Topic Papers were drafted in the early part of 2016 to provide elected members with baseline information to inform the preparation of the Local Development Plan. As such the information presented within this topic paper is intended to:
 - Build the capacity of the members to make informed planning decisions, particularly within the plan making context;
 - Provide baseline information which will inform Development Plan Policy making at a local level;
 - To link with important ongoing work in relation to the development of a Community Plan (the Belfast Agenda) and other strategic work being undertaken by the Council.
- 1.7. These papers were presented to members for discussion at a series of informal workshops with Planning Committee Members throughout the Spring 2016, with key issues and opportunities for the City identified for consideration.
- 1.8. It has since been updated to ensure the statistics referenced are up to date for publication alongside the Preferred Options Paper.
- 1.9. Climate change can be described as long term changes to weather patterns as a result of industrialisation, and the use of fossil fuels, which has increased the amount of greenhouse gases (GHG) being released into the atmosphere. The impacts of climate change indicate increased extreme weather events, storm surges, higher temperatures, more episodes of heavy rainfall, and flooding presenting a risk for people, property, infrastructure, the economy, habitats and species.
- 1.10. In 2009 the then Chief Scientific Advisor to the UK Government, Sir John Beddington, warned that the world faced a “perfect storm” of events given the challenges associated with ensuring food security to meet a growing population coming out of poverty while

tackling climate change and sustainably managing rapid growth in demand for energy and water (Beddington 2009):

“It is predicted that by 2030 the world will need to produce around 50 per cent more food and energy, together with 30 per cent more fresh water, whilst mitigating and adapting to climate change. This threatens to create a ‘perfect storm’ of global events...” Beddington 2009

- 1.11. The planning system is important for promoting sustainable development. In Great Britain the National Planning Policy Framework 2012 (NPPF) is clear that local planning authorities, working closely with their communities, should proactively plan to mitigate and adapt to climate change to shift to a low carbon society. Planners can influence the design of developments in ways which mitigate and adapt to a more unpredictable climate, supported by development management systems.
- 1.12. The Local Development Plan policies can play a key role in helping to mitigate and adapt to the effects of climate change through sustainable approaches to building design, supporting low and zero carbon energy generation, transport, creating and maintaining habitats and open space, and addressing and mitigating against flood risk. The Planning system can also protect and create integrated natural spaces that sequester carbon (particularly forests) to provide a cooling effect in cities as well as manage storm water to minimise flooding. Local Development Plan-making for urban areas, can help to reduce energy demand (for example, through less travel and more sustainable forms of transport) and promote alternative sources of energy and fuel. It will have the potential benefit of increasing energy and resource security for the City, making it attractive for Developers and Investors. Sustainable approaches to design and construction can also assist in reducing fuel poverty and protecting the population from extreme temperatures.
- 1.13. There is the opportunity to both help to mitigate the impacts of climate change and ensure that we are in a position to adapt to the impacts of future climate change.
- 1.14. **Mitigation – to slow climate change by reducing the amount of greenhouse gases in the atmosphere.**
- 1.15. **Adaptation – measures to adapt to our changing climate. Predictions are for warmer and wetter winters, hotter and drier summers, rising sea levels and increased extreme weather conditions.**
- 1.16. The Local Development Plan has a clear role to play in supporting the shift to a low carbon city. New policies will be required on low carbon developments in the Local Development Plan. This paper aims to establish the direction that future Local Development Plan policies should take based on an assessment of research, national policies and guidance.

2.0 Policy Context

National / European Policy

- 2.1. The **Climate Change Act 2008**, covering England, Scotland, Wales and Northern Ireland, established a legislative framework to enable the reduction of UK GHG emissions by 80% from 1990 levels by 2050 and by 34% by 2020. It also introduced legally binding five-year carbon budgets, which set a ceiling on the levels of GHG the UK can emit to secure the 2050 target.
- 2.2. The European Union (EU) has a target of reducing GHG emissions from 1990 levels by 20% by 2020 and 40% by 2030. These targets ensure that the EU is on the cost-effective track towards meeting its objective of cutting emissions by at least 80% by 2050.

The United Nations Paris Agreement

- 2.3. The United Nations Paris Agreement signed by 195 countries and the EU in December 2015, is a legally binding agreement in International Law, requiring all signatories to reduce Green House Gas (GHG) emissions to limit global temperature rise to 2°C, and that efforts should be pursued to limit to 1.5 degrees. The Paris Agreement marks a clear turning point towards a sustainable and low carbon future, and sends a strong signal to investors that governments are committed to a low carbon economy. It establishes a new long term goal to strengthen adaptation and resilience to reduce vulnerability to climate change. The agreement is an important step forward, to limit global temperature rises and to avoid the worst impacts of climate change. This is vital for long-term economic and global security.

Regional Policy

Draft Programme for Government (2016-21)

- 2.4. The Northern Ireland Executive, in its draft Programme for Government (2016-21), has a target of continuing to work towards a reduction in GHG emissions by at least 35% on 1990 levels by 2025. The measures taken to reduce GHG Emissions will make a contribution to mitigating the effects of climate change. It will reduce our dependence on fossil fuels, and increase resource and energy efficiency.

Northern Ireland Executives Sustainable Development Strategy

- 2.5. The Northern Ireland Executive's Sustainable Development Strategy recognises that concentrated efforts across all sectors will be needed to improve energy efficiency and reduce carbon emissions in order to address the challenges presented by climate change and the need for sustainable development.

Regional Development Strategy (RDS) 2035

- 2.6. Sustainable development is at the heart of the Regional Development Strategy. The RDS aims to "meet the needs of the present without compromising the ability of future generations to meet their own needs." Our society and economies are completely dependent on the environment which encompasses them and are therefore bound to its limits and capabilities. Climate change is widely accepted as a major environmental threat with increases in annual rainfall and average temperatures potentially impacting on society, the economy, species and habitats.
- 2.7. The RDS Objective - Take actions to reduce our carbon footprint and facilitate adaptation to climate change - It is recognised that climate change is one of the most serious problems facing the world, and we need to play our part to reduce and offset our impact on the environment. We need to reduce harmful green house gas emissions to help reduce the threat of climate change and promote sustainable construction, consumption and

production. This means an even greater focus on where people live and work and how transport and energy needs are planned. A holistic approach is required to integrate physical economic and social developments to mitigate and adapt to climate change and create a resilient city.

Strategic Planning Policy Statement

2.8. The Strategic Planning Policy Statement has stated that the Planning System should:

- Shape new and existing developments in ways that and positively build community resilience to problems such as extreme heat or flood risk;
- promote sustainable patterns of development, including the sustainable re-use of historic buildings where appropriate, which reduces the need for motorised transport, encourages active travel, and facilitates travel by public transport;
- require the siting, design and layout of all new development to minimise resource and energy requirements that would help to reduce greenhouse gas emissions;
- avoid developing in areas with increased vulnerability to the effects of climate change, particularly areas at significant risk from flooding, landslip and coastal erosion and highly exposed sites at significant risk from impacts of storms;
- consider the energy and heat requirements of new developments when designating land for new residential, commercial and industrial development and making use of opportunities for energy and power sharing, district heating, or for decentralised or low carbon sources of heat and power wherever possible;
- promote the use of energy efficient, micro-generating and decentralised renewable energy systems; and
- work with natural environmental processes, for example through promoting the development of green infrastructure and also the use of sustainable drainage systems (SuDs) to reduce flood risk and improve water quality.

Local Policy

2.9. In the BMAP 2015 there is no overarching policy highlighting the importance of climate change and the transition to a low carbon society. Through the local planning process there is the opportunity to both help to mitigate the impacts of climate change and ensure that we are in a position to adapt to the impacts of future climate change. The proposed Local Development Plan spatial strategy is based on sustainable planning principles seeking to minimise GHG emissions by creating resilient communities that focus on sustainable travel and seek to minimise the use of land and resources.

2.10. Policies will be considered in the proposed Local Development Plan that will mitigate and adapt to climate change. It is proposed that summarising the wider issue and identifying the relevant policies will help to place a greater emphasis on climate change and ensure that it is given the appropriate weight in the decision making process.

3.0 Environmental Change

Mitigating climate change – Moving to a Low Carbon Future

- 3.1. Definition - Mitigation is to slow climate change by reducing the amount of greenhouse gases emission in the atmosphere.

Northern Ireland Green House Gas Emissions

- 3.2. Northern Ireland accounted for 4% of UK emissions in 2014. UK-wide, greenhouse gas emissions decreased 8% between 2013 and 2014, with an average annual fall of 2.2% between 2009 and 2014. Northern Ireland emissions decreased (3%) with an average decrease of 0.4% per year between 2009 and 2014. In Northern Ireland, emissions in 2014 fell to 20.3 MtCO₂e. Northern Ireland's target requires less emissions reduction compared to the Scottish and Welsh targets, reflecting the larger share of its emissions from difficult to reduce sectors (in particular agriculture).

- Emissions in 2014 **fell** in power, residential buildings and waste.
- Emissions in 2014 **rose** in non-residential buildings, industry and transport.

- 3.3. Northern Ireland has a target to reduce emissions in 2025 by at least 35% compared to 1990 levels. In 2014, emissions in Northern Ireland were 17% below their 1990 levels. The Northern Ireland Executive projections suggest that progress is falling short of what is required in order to meet the 2025 target. (Meeting Carbon Budgets – 2016 Progress Report to Parliament Committee on Climate Change June 2016.)

- 3.4. Power - Power sector emissions fell across the devolved administrations in 2014 due to a fall in demand and changes in the fuel mix. In Northern Ireland, emissions fell 6%. Emissions are 28% lower than 1990 levels. The sector accounts for 19% of total Northern Irish emissions.

- 3.5. Residential Buildings - Emissions from residential buildings in Northern Ireland fell 14% in 2014, following a period of little change between 2009 and 2013. The sector accounted for 13% of total emissions in 2014, and emissions were 33% lower than in 1990.

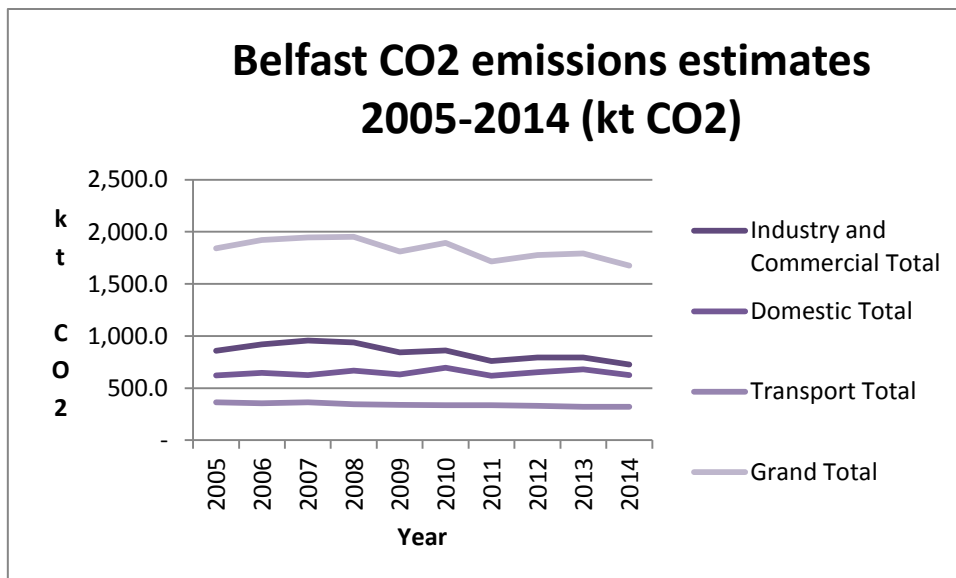
- 3.6. Non Residential Buildings - In Northern Ireland, emissions from non-residential buildings rose 10%. This was due to a rise in emissions from the commercial sector of 35%, while those from the public sector fell by 7%. The non-residential buildings sector accounted for 2% of Northern Ireland emissions in 2014. Emissions from industry in Northern Ireland accounted for 12% of total emissions in 2014 and rose by 1.5%, with an annual average increase of around 1% between 2009 and 2014. They are 30% lower than in 1990.

- 3.7. Transport- In Northern Ireland, transport emissions rose by 0.5% in 2014, with an annual average decrease of 0.9% between 2009 and 2014, but was 30% higher than in 1990. Emissions from the sector were 21% of overall Northern Irish emissions in 2014. The increase in emissions since 1990 largely reflects an increase in car ownership rates in Northern Ireland, which are now comparable with the UK average. Northern Ireland has the highest share of road emissions from rural driving at 61%, compared with 55% in Wales, 49% in Scotland and 39% across the UK as a whole in 2014.

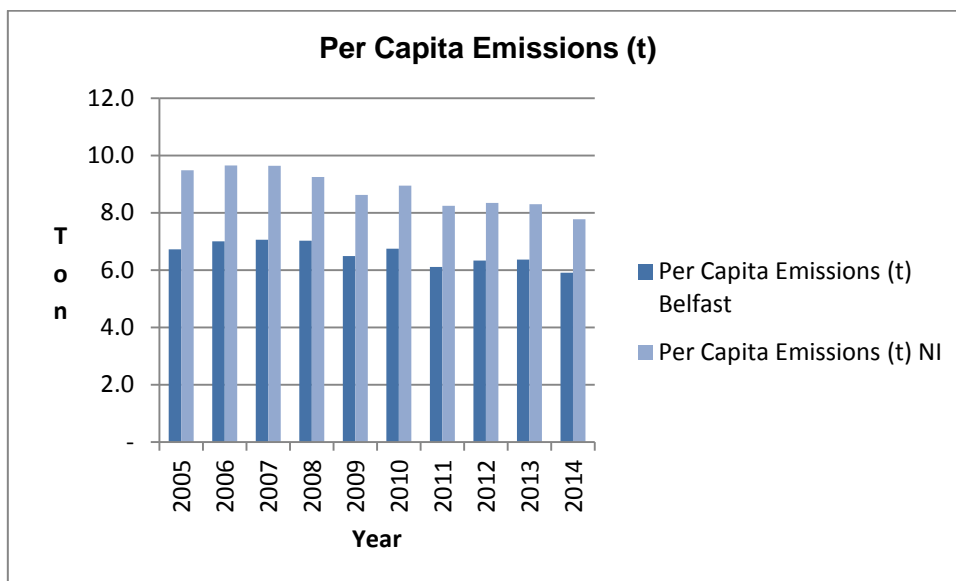
- 3.8. Waste - Waste emissions account for only a small proportion of total emissions, 3% in Northern Ireland. In 2014, emissions from waste declined by 10% in Northern Ireland.

- 3.9. In 2013, Belfast CO₂ Emissions per Capita (tons) was 6.08 (ranked 21 out of 63 UK Cities. (Centre for Cities Outlook January 2016). Buildings accounted for 80% of GHG emissions and Transport accounted for 19% of GHG emissions in Belfast during 2014. In 2014, Belfast

CO2 Emissions per Capita (tons) was 5.9. (Local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2014).



UK local authority and regional carbon dioxide emissions 2005-2014
National Statistics: (June 2016)



UK local authority and regional carbon dioxide emissions: 2005-2014
National Statistics (June 2016)

Air Quality Management Areas

- 3.10. The City has four Air Quality Management Areas due to excessive levels of nitrogen dioxide (NO₂) and particulate matter pollution from road transport. In 2006 an Air Quality Action Plan for the city was developed to address the problems in these areas.
- 3.11. The Council is required to comply with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland via Part III of the Environment (NI) Order 2002. The Council also has to achieve the European Commission air quality limit values at national level in

accordance with the EU Directive 2008/50 for air quality and cleaner air for Europe. Belfast did not achieve the limit values for nitrogen dioxide by the 2010 deadline. In 2012 the EU Commission rejected both the request for a time extension notification and the Air Quality Action Plan for the Belfast Metropolitan area, because it did not demonstrate that compliance with the annual NO₂ limit value could be achieved by January 2015. Currently the Council is preparing, in consultation with other relevant authorities and the Department of the Environment (NI), a supplementary Air Quality Plan, to reduce the levels of NO₂ to comply with the EU Directives.

- 3.12. Consideration needs to be given on how to decrease green house gas emissions by encouraging the reduction of energy consumption and the move to more sustainable methods of energy production. The use of fossil fuels and greenhouse gas emissions can be reduced by improving energy efficiencies in Transportation, Urban Design, and Buildings.

Sustainable and secure energy supply

- 3.13. The decarbonisation of the power sector is the key to achieving emissions reduction targets. The NI Executive's the Strategic Energy Framework has a target of 40% electricity consumption from renewable sources and a 10% renewable heat target by 2020, in line with mandatory EU renewable targets. This is likely to mean an increase in the number of wind farms solar PV, tidal stream and bio-energy sources, and the grid infrastructure to support them. A renewable heat strategy is likely to require new renewable heat infrastructure, such District Heating Schemes, to support it.
- 3.14. Increasing the contribution that renewable energy can make to the energy mix will reduce reliance on fossil fuels and improve security of supply. To build an outward-looking, dynamic and liveable City, significant investment is required in upgrading the electricity infrastructure, increasing renewable energy generation, and exploring the potential to develop a renewable heat generation and distribution network.

Envisioning the Future Considering Energy in Northern Ireland to 2050

- 3.15. In 2013 DE developed a vision for future energy supply and demand in Northern Ireland in 2050, to help inform thinking and further analysis of the decisions and policy needed. The focus of the study was on the three key parts of the energy sector: electricity, heat and transport. It provides two possible scenarios for the future, though there are still uncertainties inherent in any long term vision:
- *Scenario 1: This considers a continuation of trends from 2020 in the move toward increased security of supply and decarbonisation2;*
 - *Scenario 2: This considers a more aggressive change towards higher security of supply, greater decarbonisation, with higher levels of energy efficiency and greater moves to renewable energy.*
- 3.16. It envisages that overall electricity use in Northern Ireland would increase significantly, by between 39% and 44%. This is due to a predicted increase in electric vehicles (up to 80% of passenger km are in cars fuelled by electricity (direct or via hydrogen)), and switching from fossil fuels to electricity for heating buildings, either as direct resistive heating or for heat pumps. Electricity supply in 2050 sees a large shift to renewable energy generation, where the main potential increases are for onshore and offshore wind, with important increases in tidal stream, solar PV and large biomass. It envisages potential for district heating schemes in Belfast, to supply renewable heat from Biomass.
- 3.17. The outcomes envisaged for 2050 suggest that Scenario 2 would potentially deliver energy related (electricity, heat and transport) .GHG reductions by 80%, through:

- a switch to renewable electricity as the main form of electricity generation;
- a move to renewable heat;
- improved efficiency of buildings, industry processes, lights and appliances;
- uptake of electric vehicles, plug in hybrid vehicles and fuel cell vehicles.

- 3.18. However this does not include emissions from additional sectors such as agriculture, land use change and industrial processes. Reducing emissions in some of these sectors is hard to achieve without placing very restrictive measures in place that would affect their economic well-being. Hence to meet an overall 80% reduction in energy and non-energy emissions, there is a need to achieve a greater than 80% reduction in the energy related share. This may or may not be required in Northern Ireland, but the importance of the agricultural sector to the Northern Ireland economy may mean that this is the case. Work is on-going in Northern Ireland and in the UK, to better understand and assess the emissions and emission reduction potential in agriculture. It will require a sustained and concerted effort to deliver the 80% reduction in GHG to meet the UK Target by 2050, and would require all sectors of the economy to act.
- 3.19. A robust and sustainable energy infrastructure is required to maintain the City's global economic competitiveness and community resilience. This will need to deliver reliable and secure sources of energy to communities and businesses across Belfast. It should be noted that major global businesses are now committed to securing 100% renewable energy supply before 2050.

Reduce our carbon footprint Green House Gas & Air Pollution - Transportation

- 3.20. Environmental change and air pollutants share common sources. Greenhouse gases are most active high up in the atmosphere, whereas the most important factor for air quality is the concentration of pollutants nearer the earth's surface.
- 3.21. Air pollution from particulate matter is currently estimated to reduce the life expectancy of every person by an average of 7-8 months. The young and infirm are often particularly affected, as well as people living in deprived areas. In addition, emissions of sulphur (SO₂), nitrogen (NO) and ammonia (NH₃) can be deposited on land and water causing either acidification, or nutrient enrichment (eutrophication). It is important that Belfast plays its part by reducing air pollution and greenhouse gas emissions and preparing for the impacts of climate change.
- 3.22. The City has four Air Quality Management Areas due to excessive levels of nitrogen dioxide (NO₂) and particulate matter pollution from road transport. In 2006 an Air Quality Action Plan for the city was developed to address the problems in these areas.
- 3.23. The Council is required to comply with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland via Part III of the Environment (NI) Order 2002. The Council also has to achieve the European Commission air quality limit values at national level in accordance with the EU Directive 2008/50 for air quality and cleaner air for Europe. Belfast did not achieve the limit values for nitrogen dioxide by the 2010 deadline. In 2012 the EU Commission rejected both the request for a time extension notification and the Air Quality Action Plan for the Belfast Metropolitan area, because it did not demonstrate that compliance with the annual NO₂ limit value could be achieved by January 2015. Currently the Council is preparing, in consultation with other relevant authorities and the Department of the Environment (NI), a supplementary Air Quality Plan, to reduce the levels of NO₂ to comply with the EU Directives.
- 3.24. Consideration needs to be given on how to decrease green house gas emissions by encouraging the reduction of energy consumption and the move to more sustainable

methods of energy production. The use of fossil fuels and greenhouse gas emissions can be reduced by improving energy efficiencies in Transportation, Urban Design, and Buildings.

- 3.25. Efficient transport is vital to economic wellbeing and road transport remains the dominant transport mode in Northern Ireland. However, traffic and new road capacity can bring with them concerns over congestion, air quality and noise. Belfast has a weak public transport system, and private cars are widely used in the city contributing to increasing GHG emissions. Without a considerable change in behaviour, carbon emissions will continue to rise. It is also the only sector where GHG emissions are rising rather than falling. In order to address this we need to promote ways to make the most efficient use of our infrastructure and land uses, so that we can move people and freight safely and reliably while also reducing pollution.
- 3.26. This will involve reducing the need to use the car for short urban journeys within Belfast. By designing neighbourhoods that have shops, workplaces and services, schools, churches, parks, and other amenities near homes, residents and visitors will have increased opportunities for walking, cycling, or taking public transport as they go about their daily lives. This will include the need to adapt the existing transport network to facilitate the modal shift away from the car. The car may be essential for some journeys but the social and economic value of a cleaner and quieter City, needs to be weighed against the vehicle's impact on the environment.

Driving the Future Today: A strategy for ultra low emission vehicles in the UK

- 3.27. This strategy published by the Office for Low Emission Vehicles (OLEV) September 2013, states that we have begun a period of change in the way we power our motor vehicles, a period which will provide hugely significant opportunities for the UK to grow its economy, improve our environment and deliver people the independence and mobility they want. The vision is that by 2050 almost every car and van in the UK will be an ultra low emission vehicle (ULEV)(Ultra-Low Emission Vehicles include battery electric vehicles, plug-in hybrid vehicles and fuel cell vehicles); this would reduce our reliance on foreign energy imports, to reduce GHG emissions and to clean the air in Cities. Increasing use of ultra low emission vehicles therefore has a very important role to play in supporting mobility while reducing the GHG emissions and air quality impact of road transport.
- 3.28. The mass adoption of ULEVs will have significant implications for the energy sector at both a local and a national level. As the number of plug-in vehicles on our roads increases, so will the demand for electricity, placing additional pressures on the electricity infrastructure network.
- 3.29. However, ULEVs can also help to balance the demand for electricity at peak periods and support the efficient use of energy by consumers. This will be facilitated by the introduction of intelligent power supply networks (smart grids). The majority of plug-in vehicle owners will charge their vehicles at home, at night time, during the off-peak period. This is not only most convenient for drivers, but also maximises the environmental and economic benefits of plug-in vehicles by using cheaper, lower carbon night-time electricity generation.
- 3.30. To help people charge at home as easily as possible, there is a requirement for a charging infrastructure. This will allow recharging to happen when it is cheapest for consumers and the energy system (subject to appropriate technology in the charge point or plug-in vehicle). Plug-in vehicles could also act as distributed energy storage during periods when renewable electricity generation exceeds demand. This could happen during the life of the vehicle or as a potential end-of-life use for batteries. There may even be the potential for these vehicles to be used as an energy store, to power the house or feed electricity back to the grid at peak periods.

- 3.31. The eCar project in Northern Ireland has installed electric vehicle charging infrastructure and offers grants to electric vehicle owners to install charging points in their homes or work places. There are 460 charging points available at 174 different locations. In 2013/2014 the usage of the public charging points increased by 790%.

Adapting to Climate Change – Making the City Safe and Resilient

- 3.32. Definition - Adaptation are measures to adapt to our changing climate. Predictions are for warmer and wetter winters, hotter and drier summers, rising sea levels and increased extreme weather conditions.
- 3.33. Belfast has had direct experience of extreme weather patterns and rising sea levels in recent years. There have been five significant flood events in Belfast in the last ten years. The impact of flooding on individual households, communities and business can be devastating and costly. The effects of flooding on human activity are wide ranging, with the potential to cause fatalities and injury, displacement, pollution and health risk. Damage to buildings, can severely compromise economic and social activities. Extreme weather resulting in flooding of properties and infrastructure is expected to be a significant long term risk associated with climate change for Northern Ireland. (DEFRA, 2012. UK Climate Change Risk Assessment: Climate Change, Risk Assessment for Northern Ireland). The prediction is for more intense rainfall and stormier weather in summer months, wetter winters and rising sea levels. We are likely to experience more frequent damaging floods. It has been recorded that between 2002-11, on average 27% of annual rainfall fell during the summer months (June to August). In 2007 45% of the annual rainfall occurred in these three summer months. (Annual NI Environmental Statistics Report). Flooding is a natural process that cannot be entirely prevented. However some areas are already susceptible to intermittent flooding from rivers, storm water and the sea.

Climate Change - UK Climate Change Risk Assessment 2017: Evidence Report Northern Ireland

- 3.34. This report outlined the observed and predicted changes due to increasing GHG emissions.
- 3.35. The latest set of projected changes in climate for Northern Ireland comes from the 2009 UK Climate Projections. Under a medium emissions scenario, regional summer mean temperatures are projected to increase by between 0.8 – 4°C by the 2050s compared to a 1961-1990 baseline. Regional winter precipitation totals are projected to vary between 0 to +19% with summer precipitation reducing by up to 41% and winter precipitation increasing by 27% by the end of the century. Potentially there will be higher intensity rainfall events that will cause flood from storm water. The average sea level for Belfast is expected to increase by between 22.8 cm and 37.6 cm by 2090 compared to a 1990 baseline. However, sea levels are projected to continue to rise beyond 2100 even in lower emission scenarios and several meters of sea level rise within centuries is possible. In Northern Ireland annual average temperatures over land have warmed in recent decades. The 2005 - 2014 decade was 0.7°C warmer than the 1961-1990 average. The daily maximum and minimum temperature extremes have increased by just over 1°C since the 1950s.
- 3.36. The consequence of increasing temperatures is the impact on the young and elderly population. Excessive heat causes discomfort and premature death, with over 600 cases of heat-related deaths reported in the UK alone during the heat wave of July 2013. This will become an increasing problem in urban areas where temperatures tend to be higher due to the hard surfaces absorbing and slowly releasing the heat so that Cities tend to be hotter than the surrounding countryside. In effect cities have their own micro climate known as urban heat island (UHI).
- 3.37. There is also strong evidence linking flooding to reduce economic growth. A study focussing on European nations found that a one per cent increase in the area experiencing

extreme rainfall can reduce GDP growth by 1.8 per cent (this is even higher for drought at 2.7 per cent).

- 3.38. Belfast is a densely built urban area with the River Lagan running through the City Centre, into Belfast Lough, and the numerous rivers and streams flowing from the Belfast Hills through the Neighbourhoods, Belfast is vulnerable to many of these changes. Events such as flooding and extreme heat can have detrimental impacts on people's health directly during the event and afterwards in dealing with the aftermath. It is therefore important that we plan for Belfast to cope with these changes in the future.
- 3.39. The Local Development Plan will need to take account of climate change over the longer term, including factors such as flood risk, water supply, changes to biodiversity and landscape. New development should be planned to avoid increased vulnerability to the changes in weather patterns, and ensuring that the risk can be managed through suitable adaptation measures, such as green infrastructure. As a result, climate change adaptation is integral to the overall approach of this Plan.

Improve the Energy Efficiency and Adaptability of Buildings.

- 3.40. Most of today's buildings were designed for the climate that existed when they were built, and are not necessarily equipped to cope with current and future climates. Around 75% of the current building stock will be standing in 2050. In Belfast, homes and other buildings accounted for 80% of green house gas emissions in 2014. (Local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2014). Improvements to buildings are required to minimise energy use and encourage zero carbon emissions, while ensuring that the character of buildings of architectural or historic interest is maintained. The key to this will be in enabling householders and property owners to respond to energy uncertainty and future energy scarcity and to fully contribute to GHG emissions reductions to secure a low-carbon society.
- 3.41. Increasingly new technology is being developed that will help society to mitigate and adapt to climate change. It will also improve digital connectivity to reduce potential travel or the need for physical assets, which increasingly will have a virtual presence to provide a service. Also there are emerging smart technologies that would help to improve mobility for visitors, tourist, disabled and elderly people to navigate around the city. New developments should consider the provision of, or should be adaptable to provide for new smart digital technology infrastructure.
- 3.42. There is a need consider how new housing and buildings could be flexibly used over their lifespan. Property development proposals should indicate how they will attract business and residential tenants through providing the environmental infrastructure that will be expected such as Combined Heat & Power, electric vehicle charging, smart metering, smart connected street furniture, and local energy grid. Buildings should incorporate space for environmental monitoring, interactive portals, and connectivity to enable remote environmental monitoring, tele-health systems and remote working. Also there is a need to consider emerging practices from Smart Cities for shared facilities and collaborative working spaces.

Environmental Adaptation - Green and Blue Infrastructure within Urban Areas

- 3.43. There have been an increasing number of flood events in Belfast in recent years and these have demonstrated the potential for widespread impact and our vulnerability to this risk. The impact of flooding on individual households, communities and business can be devastating and costly. The effects of flooding on human activity are wide ranging, with the potential to cause fatalities and injury, displacement of people, pollution and health risk, damage to buildings, adverse environmental impacts and to severely compromise

economic and social activities. (Economic growth /business insurance premiums /damage critical infrastructure). Extreme weather resulting in flooding of properties and infrastructure is expected to be a significant long term risk associated with climate change for Northern Ireland. (DEFRA, 2012. UK Climate Change Risk Assessment: Climate Change Risk Assessment for Northern Ireland). The predictions of more intense rainfall and stormier weather in summer months, wetter winters and rising sea levels, we are likely to experience damaging floods more frequently and intensely. It has been recorded that between 2002-11, on average 27% of annual rainfall fell during the summer months (June to August). In 2007 45% of the annual rainfall occurred in these three summer months. (Annual NI Environmental Statistics Report). Within the last ten years there have been five significant flood events in Belfast which has caused considerable disruption for property owners. Flooding is a natural process that cannot be entirely prevented. However some areas are already susceptible to intermittent flooding from various sources, principally from:

- Rivers / watercourses, (fluvial)
 - Coastal
 - Surface water runoff. (pluvial / ponding)
- } *Greatest threats to loss of life*

- 3.44. Climate change predictions indicate that temperatures are increasing, and this will pose a particular problem for urban areas. Urban areas generate, absorb and store a lot of heat energy which could be a big problem for people living in the City. Local hot spots are generated when solar power absorbing plants (trees, grass, soil, lakes, etc.) are replaced by high thermal inertia concrete, asphalt and highly reflective glass. The situation is made worse when this is combined with an impermeable surface where water cannot trickle into the ground. Green infrastructure such as parks, green spaces and street trees can be used to moderate the effect as can blue infrastructure such as ponds, streams and lakes.
- 3.45. In cities, concrete structures absorb solar radiation and retain heat during the day, slowly emitting it at night, starting the process again each day. It leads to the so-called 'urban heat island effect' where cities are often several degrees warmer than their surroundings. On top of climate change, it means some stifling conditions to come. Installations like tree lined streets, living walls and green roofs can mitigate this effect as they facilitate evaporative, endothermic cooling. That can also save on air conditioning costs for buildings.
- 3.46. Cities struggle to cope with flash floods of the sort we are likely to see more of with climate change resulting in problematic runoff. Green roofs, rain gardens and swales can help in the most basic fashion by holding onto large quantities of water. More engineered solutions can also store water for subsequent reuse in a closed loop system.
- 3.47. Green house gas emission has increased the amount of carbon dioxide (CO₂) and other pollutants in the atmosphere. Plants extract CO₂ from the air for use in photosynthesis. There are also some species that can capture, degrade, or eliminate pollutants and heavy metals from the air, soil and water.
- 3.48. The UK imports approximately 60% of food annually. Cities are net importers of food, however with increasing competition for food from Developing Countries, this will mean higher food prices, and shortages, stormy weather will cause supply disruptions. Increasingly compact urban farming solutions such as allotments, hydroponics and aquaculture can help cities and communities to become more self-sufficient food producers.
- 3.49. Green and Blue infrastructure planning is a holistic approach that seeks to identify the functions that are being provided by the parks, trees, gardens, waterways and grassland across the whole of the city. In particular, how these functions, as public recreation, water management and reducing air pollution, provide benefits to address local needs and the key issues for the city. In planning for a Green and Blue infrastructure all areas of

vegetation and water are assessed collectively, treating them as a system, that can provide a critical infrastructure to help the city adapt to climate change as well as creating an attractive environment that can deliver economic and social benefits.

- 3.50. Environmental adaptation measures are closely linked to the long-term planning of urban development. It is a focused effort to plan a greener City that can be a preventive investment to climate-proof Belfast and to deliver a high level of quality of life, and better health outcomes for the city's population. The Local Development Plan presents an opportunity to outline climate adaptation policies and proposal to promote the integrated planning of the city to provide an integrated Green and Blue Infrastructure
- 3.51. The Stern Report on the economics of Climate Change stated that climate change could have very serious impacts on growth and development. The costs of extreme weather, including floods, droughts and storms, are already rising. Climate change will affect the basic elements of life for people particularly access to a secure food and energy supply, health, and the environment. The costs of stabilising the climate are significant but manageable; delay would be dangerous and much more costly.

4.0 Issues and Approaches

- 4.1. Mitigating and adapting to environmental change could create significant opportunities, as encouraging the adoption of new low-carbon energy technologies could help grow the economy and employment. The City does not need to choose between averting environmental change and promoting economic growth and development. Changes in energy technologies have created opportunities to decouple economic growth from greenhouse gas emissions. Indeed, ignoring environmental change will eventually damage economic growth. Tackling environmental change is the pro-growth strategy for the longer term, and it can be done in a way that does not restrict the aspirations for economic and population growth in Belfast.
- 4.2. The poorest communities will be the most vulnerable group to be affected by environmental change. It is essential that adaptation to environmental change should be fully integrated into planning policy, so that the City will be more resilient to flood risk, to reduce fuel poverty, improve air quality and secure better health outcomes.
- 4.3. GHG Emissions can be cut through increased energy efficiency, changes in demand, and through adoption of clean power, heat and transport technologies. The power sector around the world will need to be decarbonised and deep emissions cuts will also be required in the transport sector. With strong, policy choices, it is possible to reduce emissions while continuing to grow the economy. Planning policies such as supporting innovation, energy efficiency measures, the deployment of low-carbon technologies and sustainable forms of transport can help to reduce GHG emissions.
- 4.4. The costs of stabilising the climate are significant but manageable; delay would be much more costly. The risks of the worst impacts of environmental change can be substantially reduced if GHG levels in the atmosphere can be reduced to secure the Government target of 80% by 2050. This is a major challenge, but sustained long-term action can achieve it at costs that are low in comparison to the risks of inaction. Costs could be even lower if there are major gains in efficiency, or if there are strong co-benefits, from reduced air pollution and improved health, are measured. Costs will be higher if innovation in low-carbon technologies is slower than expected, or if policy-makers fail to make the most of spatial planning tools that allow emissions to be reduced
- 4.5. Adaptation to climate change is essential, but it is still possible to protect our community and economy from its impacts to some extent, by ensuring that planning policies encourage adaptation and facilitating climate-resilient infrastructure, such as green and blue infrastructure, and buildings.
- 4.6. The spatial plan is an important place shaping tool, which should help to create a compact city that could adapt to climate change. With an excellent range of services, housing, and good public transport and cycle network this could encourage people and businesses to locate in Belfast. A strong City Centre and District Shopping Centres should encourage viable service centres that serve most day-to-day needs, which could minimising the need to travel by car and thereby reducing GHG emissions. It will be important to incorporate a multi functional green and blue infrastructure network; which will have sustainable urban drainage systems, recreational spaces, as well as pedestrian and cycle paths, which would link neighbourhoods and employment areas, city centre to the countryside.

Summary of Issues - Mitigating Environmental Change

- The Council is required to comply with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland via Part III of the Environment (NI) Order 2002.
- The Council also has to achieve the European Commission air quality limit values at national level in accordance with the EU Directive 2008/50 for air quality and cleaner air for Europe.
- The City has four Air Quality Management Areas due to excessive levels of nitrogen dioxide (NO₂) and particulate matter pollution from road transport. The Council has a draft Air Quality Action Plan 2015 - 2020 for the city to address the air quality problems.
- Air pollution from particulate matter is currently estimated to reduce the life expectancy of every person by an average of 7- 8 months. People living in deprived areas, the young and infirm are particularly affected.
- Private cars are widely used in the city; without a change in behaviour towards sustainable transport, green house gas will continue to rise.
- A high dependency on fossil fuels for heating buildings and generating electricity produces green house gas emissions.
- Green house gas contributes to the City's poor air quality, which impacts on biodiversity.
- Need to increase the contribution that renewable energy can make to the overall energy mix.
- Lack of planned infrastructure to develop renewable energy resources (including decentralised heat and power networks) as part of new development proposals, taking into account the site's characteristics and the existing heat and power demands on adjacent sites.
- Need to secure community engagement, to ensure that they can benefit from community renewable energy schemes to build resilient neighbourhoods.
- Industry pays the second highest electricity cost in the EU, making the region uncompetitive to inward investors who want a reliable and cost effective energy supply.
- High fossil fuel dependency is prevalent with large percentage of homes in Belfast using oil for space heating. It is estimated that approximately 32% of households in Belfast face fuel poverty. (2011 House Condition Survey – District Council figures for key measures (modelled) NIHE, July 2014).

- 4.7. The LDP will need to consider how to facilitate the reduction of GHG within the plan area. It would need to determine how the deployment of renewable energy and clean technologies, sustainable building design, can be accommodated in the spatial plan for Belfast. It will be important the LDP provides a positive basis for assessing the delivery of renewable energy technology where possible in the urban area, which will be small scale. This would provide certainty for investment decisions. It would provide for the planning of new development to make use of opportunities for decentralised and local renewable sources of heat and power. It should be a strategic priority to assist in the reduction of GHG, and ensure that appropriate action is promoted throughout the Local Development Plan.
- 4.8. In promoting the deployment of renewable energy technology in the urban area it could provide the City with a competitive economic advantage in helping to market Belfast as an attractive location for inward investment, businesses, and residents who are committed to implementing their own environmental policies and practices.
- 4.9. The reduction of green house gasses as set out in the Climate Change Act, and the draft Programme for Government 2016 – 2020, would help to improve air quality in Belfast. It is

important that we create opportunities through the planning system for decentralised energy, and reducing our reliance on fossil fuels. It would also help to deliver an increase in decentralised local power generation capacity required to power electric vehicles and heating buildings. It will be important to ensure that decentralised power generation has a minimal impact on quality of life in the City.

- 4.10. Fuel poverty is an issue in disadvantaged communities which have an effect on health and well being. There is a need to reduce emissions from existing buildings. It will be critical to utilise the opportunities that arise for making cost-effective energy efficiency improvements when works to extend existing homes are undertaken. The aim should be to help homeowners implement energy efficiency and retrofitting measures to reduce energy usage and strengthen building resilience to potential flooding. Local communities developing their own renewable energy schemes can take ownership of reducing green house gas emissions and saving money whilst enjoying the benefits locally. Putting communities in control of the energy they generate and use can have wider benefits such as building stronger communities, fostering ownership, and empowering communities to be involved in securing the financial benefits; learning new skills, gaining experience and creating local jobs; and supporting local economic growth.
- 4.11. The Local Plan must address climate change mitigation. As this is a multi-faceted topic, the best way to tackle it is to ensure it is covered thoroughly throughout the plan. There is no 'do nothing' option" because the Local Plan must address climate change mitigation. The City will have to tackle green house gas emissions to contribute towards the UK Targets to reduce carbon emissions by 80% by 2050.

Summary of Issues - Adaption to Environmental Change

- Increasing temperature within the urban environment that impacts on public health.
- Increasing flood risk due to intense rainfall and raising sea levels.
- Lack of community resilience, and preparedness.
- Biodiversity at risk due to lack of adaptation measures.
- Risk to population and economic growth.

Justification

- 4.12. New development must be planned in such a way that vulnerability to the range of environmental change impacts is minimised. The Council wants to build community resilience to a changing climate through effective spatial planning. If any development is proposed in vulnerable areas, suitable adaptation measures should be included in the design to ensure that risks can be managed.
- 4.13. A number of the challenges that we expect as a consequence of environmental change, are major changes in the amount of rain fall, warming temperatures, and a general rise in sea level, over the course of the next 100 years will gradually bring an increased risk of extensive damage and loss of value if action is not taken. It will become increasingly more expensive to remediate the problems that early action is required to adapt to the changing climate.
- 4.14. The effects of environmental change will need to be considered over the lifetime of the development, especially with regards to its location and design. New developments will need to be 'climate proofed', the Council will need to encourage developers to include environmental change adaptation measures into their development proposals at the design phase. This also needs be applied to extensions and/or refurbishments to existing buildings.

- 4.15. It is important that decisions made now should not constrain future options to adapt or enhance vulnerability to environmental change. The main design issues affected by environmental change which developers and their design teams will need to consider are: location, site layout, buildings, ventilation and cooling, drainage, water, outdoor spaces; and connectivity.
- 4.16. Adaptation measures will need to be incorporated into the spatial vision and strategic priorities contained in the LDP and ensure that policies relating to Flood Risk, Green Infrastructure, and the Natural Heritage, Transportation, Public Services and Design deal with environmental change adaptation fully and are effective to build a resilient City.
- 4.17. The Local Development Plan must address environmental change adaptation to fulfil legislative commitments and to build a resilient City. As this is a multi-faceted topic, the best way to tackle Climate Change is to ensure it is covered thoroughly throughout the plan. There is no 'do nothing' option as the Plan must address environmental change adaptation. The City is already experiencing extreme weather events which has had an impact on the communities, and to do nothing will prove to be high risk and financially very expensive in the long term.
- 4.18. The information contained within this topic paper has been used to inform the next stage of the LDP process, the Preferred Options Paper.

Table of Figures