

Derry City and Strabane District Council

Green Infrastructure Plan 2019 - 2032

www.derrystrabane.com/GI



Derry City & Strabane
District Council
Comhairle
Chathair Dhoire &
Cheantar an tSraitha Báin
Derry Cittie & Stràbane
Destrìck Cooncil



DEVELOPED BY

THE DERRY & STRABANE GREEN INFRASTRUCTURE STAKEHOLDER GROUP

Green Infrastructure Plan

Derry City & Strabane District Council's Green Infrastructure Plan was endorsed by the Derry & Strabane Green Infrastructure Stakeholder Group (Appendix 1) and was recommended to the Council for approval.

Prepared by Derry City & Strabane District Council's Environment Department, on behalf of the Derry & Strabane Green Infrastructure Stakeholder Group.

Contact: Christine Doherty
Christine.Doherty@derrystrabane.com
Tel: 02871 253253

Cover image: Derry City viewed from St Columbs Park

CONTENTS

Executive Summary

1. Introduction

- 1.1 Background
- 1.2 What is Green Infrastructure?
- 1.3 Assets, functions & benefits of Green Infrastructure
- 1.4 Legislation & policy context for a Green Infrastructure Plan

2. The Green Infrastructure Vision

- 2.1 Vision
- 2.2 Aims
- 2.3 Values

3. Green Infrastructure Themes

- 3.1 Cross cutting themes
- 3.2 Key themes
- 3.3 People and Place
- 3.4 Economic Prosperity
- 3.5 Biodiversity
- 3.6 Climate Change

4. Implementation

- 4.1 Delivery
- 4.2 Funding
- 4.3 Monitoring

Glossary

References

Appendices



Executive Summary

This is Derry City and Strabane District's first Green Infrastructure (GI) Plan. It outlines a vision that GI can provide a radical new approach within the District:

"By 2032 the environmental, economic and social benefits of Green Infrastructure are valued and maximized by all"

This Green Infrastructure Plan was developed as part of the evidence base generated for the District's Local Development Plan 2032. The GI Plan reviews the existing green infrastructure (green and blue spaces), identifies gaps in provision and investigates opportunities to improve the green infrastructure. It outlines the strategic vision, aims and priorities for the District to 2032. An action plan will be launched in 2019, outlining the short, medium and long term actions to deliver this GI Plan.

The strategic themes, aims and priorities were developed through a series of workshop sessions with key stakeholders, in conjunction with an analysis of documentary evidence and an audit of current provision. The analysis of evidence and recommendations extends beyond the District's boundaries, to provide a comprehensive picture of the green infrastructure resource and to identify opportunities for developing the network and partnerships.

The key messages of the GI Plan are that:

- The GI network is valuable, but is under increasing pressure;
- Opportunities exist for working within and cross-boundary, through existing or new partnerships, to gain mutual benefits;
- The delivery of green infrastructure will be made possible through a number of potential funding mechanisms; and
- GI Implementation Plan will provide a strategic approach to prioritising actions and provide a consistent method of monitoring and reporting on delivery.

This plan has been developed and co-designed with representatives from the GI Stakeholder Group and through public consultation.

1.1 Background

The Green Infrastructure (GI) Plan is structured to provide clarity on:

- What the Plan is about;
- Where the Plan covers;
- Who the Plan is of interest to;
- Why the Plan is needed;
- The Plan's development of the Green Infrastructure; and
- How the plan will be implemented

1.1.1 What the Plan is about

The GI Plan describes the key approaches required to deliver an integrated green infrastructure network for the District. It identifies how we can protect, improve and increase its GI network. A GI network will connect green spaces (vegetated areas) and blue spaces (waterways), to provide a multitude of environmental, recreational, economic, health and wellbeing benefits for the public.

1.1.2 Where the Plan covers

The GI Plan covers the Derry City and Strabane District. Approximately 10km around the district was included to capture cross-boundary issues.

1.1.3 Who the Plan is of interest to

The GI Plan will improve the lives of local people by providing important recreational space, which provide health and wellbeing benefits. It supports ecosystem services to enhance our resilience to climate change. The GI Plan will be used by developers, planning officers, councillors, key stakeholders and the local community.

1.1.4 Why the Plan is needed

The GI Plan outlines a radical new approach to deliver social, environmental and economic benefits to make the District a better place to live, work, visit and invest. It was developed as part of the evidence base for the District's Local Development Plan (LDP) 2032. It builds upon the GI Framework (Derry City and Strabane District Council, 2018a), which was endorsed by Council in May 2018, to develop a holistic approach for a planned, high quality, well connected and multifunctional green infrastructure network, which provides a range of benefits for residents and the environment. For example, to mitigate against the impacts of climate change, to improve public parks, play park provision and access to greenways.

Historically, GI examples (parks, rivers, woodlands) were not considered as critical infrastructure. However, collectively they provide a range of environmental, economic and social benefits for the public.

1.1.5 The Green Infrastructure Plan's Development

Derry~Londonderry is a regional city and is connected to the main town of Strabane, associated local towns of Castlederg, Claudy and Newtown Stewart and the villages of Eglinton and Donemana (Figure 1.1). The district is comprised of:

- 57% farmland;
- 35% natural/semi-natural landscape (for example, heathland / natural grassland);
- 6% built fabric (roads, buildings and airports); and
- 2% green urban (parks, gardens, golf courses and sport pitches) (Rae, 2017).

There is a total of 11,651 ha of woodland (5,482 ha non Forest Service and 6,169 ha of Forest Service woodland) within the district.

In 2017, DCSDC gave a mandate to prepare a GI Plan for the District, which would contribute to the Local Development Plan 2032. Subsequently, a GI Stakeholder Group was established in September 2017, to develop the GI Framework (Derry City and Strabane District Council, 2018a). This framework provided a roadmap, to guide the development of a GI Plan and associated Action Plan. The Stakeholder Group comprises members from the public, private and community sector (Appendix 1). It will be important to identify opportunities to develop and implement actions in partnership with others, with the potential to deliver multiple benefits.

In creating this GI Plan:

- International and national green infrastructure policy was reviewed;
- Geographical Information System (GIS) mapping of the district was conducted to form the evidence base for the strategic priorities; and
- A series of workshop sessions with key stakeholders assisted in developing the key themes, strategic aims and priorities.

The GI Plan will outline the strategic vision, aims and priorities for the District to 2032. A detailed Action Plan will be launched in 2019, outlining the short, medium and long term actions required to deliver the GI vision.



Image above: Derry City Maritime Festival

01 Introduction



Figure 1.1. A map of the district

1.1.6 How the plan will be implemented

The GI Plan contains two categories of implementation themes: (Figure 1.2)

- Cross Cutting Themes – there are three cross cutting themes that will cover the general issues to be considered by all key themes; and
- Key Strategic Themes – there are four key strategic themes that support or safeguard a particular benefit or function of GI.

The GI Plan outlines 14 strategic priorities, over the four key strategic themes for the District. The themes provide an overall framework for the management of the GI.

The Cross-Cutting Themes and Key Strategic Themes will support and contribute to the achievement of the Vision, Aims and Priorities of the GI Plan.

Subsequently, a GI Action Plan will be developed, with actions developed under each of the 14 strategic priorities and cross cutting themes (Figure 1.3).

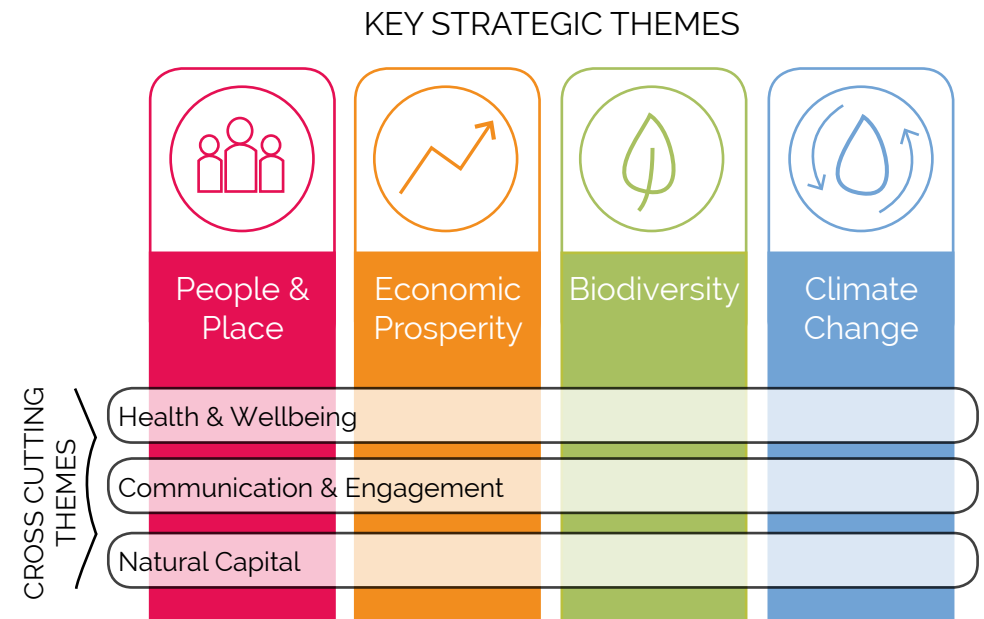


Figure 1.2. GI Cross cutting and key strategic themes

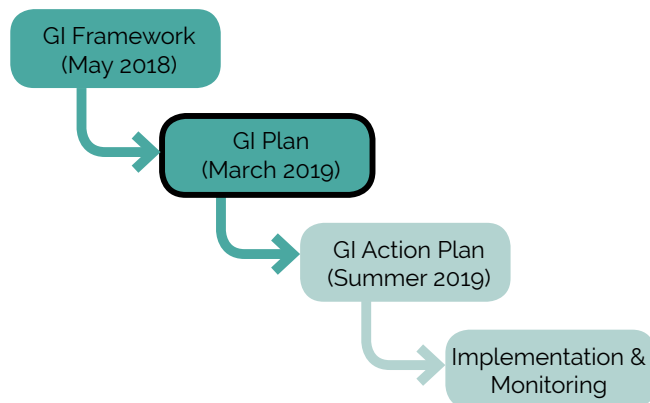


Figure 1.3. GI stages

01 Introduction

1.2 What is Green Infrastructure?

GI is an interconnected network of multi-functional green and blue spaces, which provide multiple environmental, economic and social benefits, linked throughout the urban and rural landscapes (Figure 1.4). It is mostly comprised of green spaces that are vegetated areas (for example, woodlands, parks, natural habitats, allotments and playing fields) and blue spaces are our waterways (for example, rivers, loughs, canals, lakes and ponds).

These spaces provide a mix of functions including recreation, sustainable transport, education, wildlife habitat, flood risk management, local food production, energy production and ecosystem services. Often these functions overlap, for example, a woodland can provide a habitat for wildlife, a recreational asset, a landscape feature and a fuel supply. Collectively they vitally contribute to our health and wellbeing and to the healthy function of our environment.

The quality of the District's environment affects everyone who lives in and visits the area. It helps people to stay healthy, makes it a good place to work and keeps the area functioning on a daily basis. GI allows our villages, towns and city to adapt to climate change, as it can mitigate against flooding, improve air quality, provide habitats for wildlife, improves our health, well-being and creates attractive places where people want to live and visit.

The GI Plan will deliver a strategic approach, providing a holistic overview for the creation of a planned and managed network of multi-functional green and blue spaces, which can deliver a range of environmental, economic and social benefits for local communities within the Derry City and Strabane District.

This radical new approach requires a fundamental change to the way we think about our green and blue spaces, for example, with an aspiration to incorporate more green space into the urban environment. Unlocking the value of green infrastructure will help to mitigate the decline in quantity and quality of our green and blue spaces, improving the lives of everyone who calls the city and district their home.

It requires strong collaboration between local government, central government, the voluntary sector and the local community. Community involvement with the plan and projects will help create ownership at a local level, which will deliver greater sustainability of our valuable green spaces.

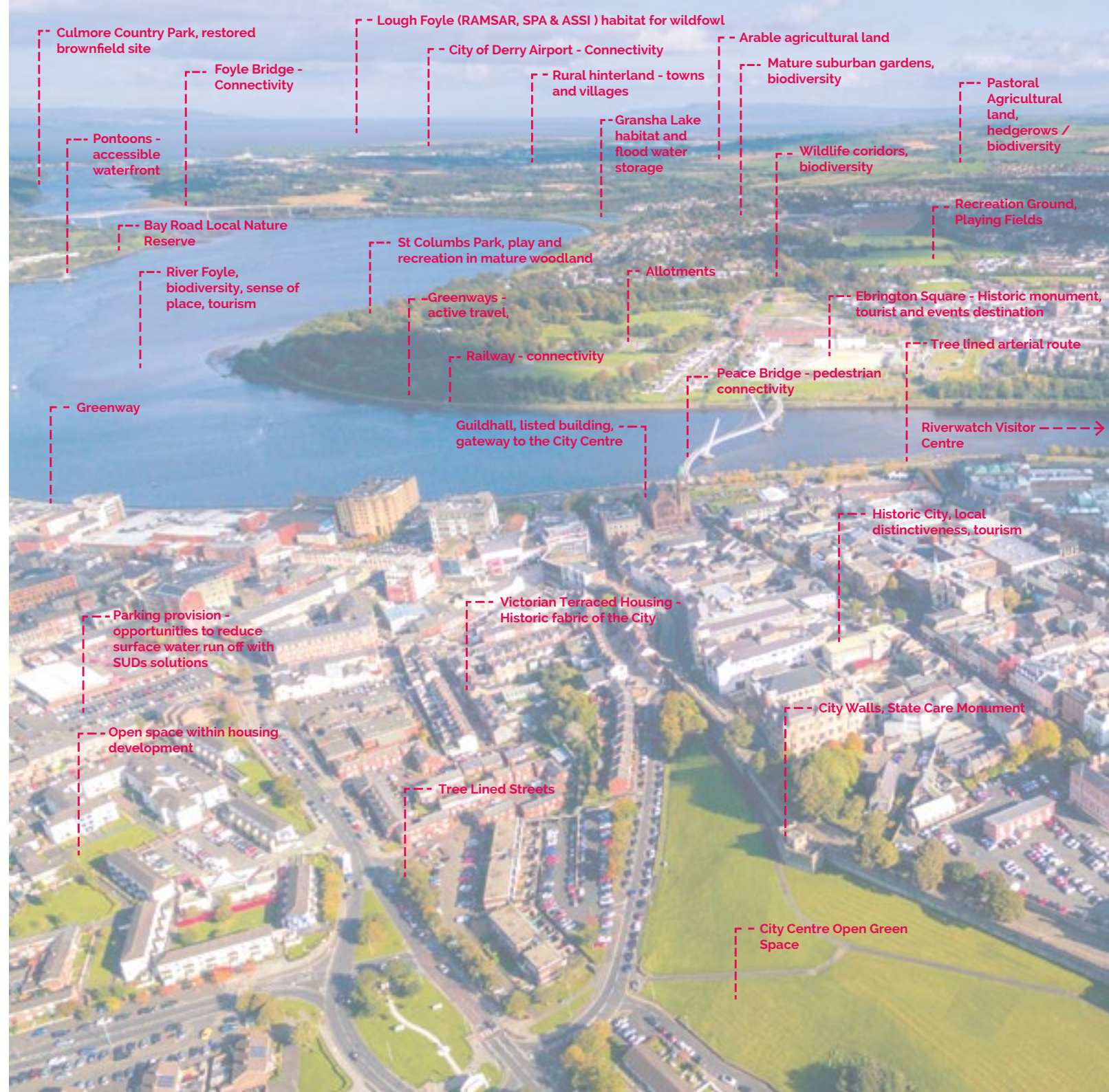
Term	Definition
Green Space	Vegetated areas (for example, woodlands, parks, natural habitats, allotments & playing fields)
Green Infrastructure	A network of multi-functional green and blue spaces
Blue Space	Waterways (for example, rivers, loughs, canals, lakes & ponds)
GI Asset	Individual components of green infrastructure, for example, parks, woodlands, hedgerows, rivers & lakes
GI Function	The roles that GI assets play are GI functions
Multi-functionality	A GI asset can perform several functions simultaneously, which is referred to as 'multi-functionality'

Figure 1.4 GI definitions

1.3 Assets, functions & benefits of GI

GI is comprised of a wide range of assets. These can operate at different scales, from small linear features (for example, hedgerows) to entire functional ecosystems (for example, peatlands). The main assets were identified for the open space audit for the Local Development Plan 2032, for the future prosperity of the District. Individually, these elements are classified as GI assets and the roles that these assets play are referred to as GI functions. Figure 1.5 outlines key assets:

- Allotments and community gardens;
- Amenity space (communal green spaces within housing areas);
- Green corridors (greenways, hedgerows, disused railway lines);
- Brownfield and greenfield sites;
- Parks and gardens;
- Play parks;
- Natural and semi-natural habitats;
- Playing fields;
- Cemeteries;
- Woodlands;
- Nature reserves and designated sites;
- Waterways;
- Development sites with potential for open space and access links; and
- Land in agri-environmental management.



01 Introduction

1.3.1 Functions

GI can maximise the number of potential functions associated with a site. GI functions are the roles that GI assets can play if planned, designed and managed. They have obvious functions, but each asset can perform several functions simultaneously, which is referred to as 'multi-functionality'. For example, a woodland provides improved aesthetic value, reduces air pollution, provides shade, provides a habitat, provides a recreational resource, stores water and carbon. Figure 1.6 outlines the key functions (environmental, economic and social) provided by GI assets.

GI Assets / Interventions	GI Functions
	Economic growth and investment
	Land and property values
	Tourism
	Sport, Recreation and leisure
	Health and well-being
	Education and life-long learning
	Sense of community
	Access and connectivity
	Ecosystem services
	Climate mitigation and adaptation

Figure 1.6 Functions of Green Infrastructure (Adapted from ECOTEC, 2008).

1.3.2 Benefits

When planned, designed and managed, GI assets and functions have the potential to deliver a wide range of benefits, from providing sustainable transport links, to mitigating and adapting to climate change. When individual sites are connected through a GI network, they can collectively reduce the risk of extreme temperatures, flooding and improve air and water quality.

GI planning is a successfully tested tool, to provide environmental, economic and social benefits, through natural solutions and helps to reduce the dependence on 'grey' infrastructure, which is often more expensive to construct, maintain and provides limited functions. Figure 1.7 shows the benefits of considering green infrastructure with grey infrastructure.



Figure 1.7 The green-grey continuum (Source: Adapted from Davies et al, 2015)

GI can provide several environmental, social and economic functions within a site, as outlined in Figure 1.8. For example, GI can physically connect areas of open space, to include the district's key parks, habitats, other open space features, greenways and blue spaces, in an interlinked network of GI corridors. Also, it will link the main urban areas with the urban fringes, countryside and with adjacent districts.

ENVIRONMENTAL	SOCIAL	ECONOMIC
Access to natural green & blue spaces	Access to sport & recreational space	Improved aesthetics and ecosystem services
Providing ecosystem services, for example, flood management, improved air & water quality	Improved physical & mental health	Improved investment by stakeholders
Enhancing biodiversity habitats, species & connectivity	Connectivity within a network	Increased land & property values
Food, fishery & energy production	Education & life-long learning	Increased tourism potential
Climate change mitigation & adaptation	Social inclusion & interaction	Cost effective way to connect villages, towns & cities
Carbon storage and sequestration	Increased sense of community	Improve resilience when used in combination with grey infrastructure

Figure 1.8 Potential benefits & functions of Green Infrastructure.

01 Introduction

1.4 Legislation & Policy Context

Protecting and enhancing the environment requires a joined-up approach across a range of different policy areas. There is a wide range of international, national and regional legislation and associated policies relevant to the creation of a GI plan. Outlined below are the key relevant legislation and policies. Appendix 2 outlines the full list of legislation and policies associated with GI.



Moor Lough, Strabane

1.4.1 Legislation

- **The Local Government Act (NI) 2014** introduced the creation of a Community Plan by local authorities to improve the long-term social, economic and environmental well-being of the district.
- **The Wildlife and Natural Environment (NI) Act 2011** introduced a statutory duty for all public bodies to further the conservation of biodiversity, which is a key theme within the GI Plan.
- **Climate Change Act (2008)** aims to reduce UK greenhouse gas emissions by 2050 and to make provision for adaptation to climate change. This is a key theme within the GI Plan.
- **The Access to the Countryside (NI) Order 1983** provides powers for local authorities to assert Public Rights of Way, enter into access agreements and record maps of Public Rights of Way. This is a key theme within the GI Plan.



Harry Avery's Castle, Newtownstewart

1.4.2 Policies

- **Regional Development Strategy 2035 (Department for Regional Development, 2010)**, provides an overarching strategic planning framework, to facilitate and guide public and private sectors. It promotes the link between environment, health and wellbeing. It recognises the importance of accessible green infrastructure and the benefits it can offer, with reference to:
 1. Ensure that environmental quality in urban areas is improved and maintained, particularly with adequate provision of green infrastructure; and
 2. Protect and encourage green and blue infrastructure within urban areas.
- **Strategic Planning Policy Statement for Northern Ireland (SPSS) Planning for Sustainable Development (Department of the Environment 2015a)**. The SPSS provides a new set of overarching core planning principles to underpin delivery of planning reforms. It has a statutory basis under the Planning Act (NI) 2011. It outlines the importance of green infrastructure:
 1. Working with the natural environment processes, for example, through promoting the development of green infrastructure;
 2. A good quality environment can also help to improve resilience to climate change, as trees and other green infrastructure provide important ecosystem services that reduce the effects of flooding and the urban heat island; and
 3. Green infrastructure provides a wide range of environmental benefits including floodwater storage, urban cooling, improved air quality and habitats for wildlife. Additionally, they can provide opportunities for social interaction by serving as a focal point for recreation and community activities. This green infrastructure should be designed and managed as a multifunctional resource capable of delivering on a wide range of environmental and quality of life benefits for communities.
- **Derry City & Strabane District's Inclusive Strategic Growth Plan 2017 -2032: Our Community Plan (Derry City & Strabane District Council, 2017)** aims to improve social, economic and environmental well-being and long-term objectives for the District, to contribute to the sustainable development in Northern Ireland. This GI Plan links with Council's Community Plan mission and aims to deliver several key actions: *'To improve the social, economic and environmental well-being of the city and district and to do so in a sustainable way.'*
- **Derry City & Strabane District's Local Development Plan 2032**, will guide land-use development, outline policies and proposals for the use, development and protection of our settlements and countryside throughout the District. Once the Local Development Plan (LDP) is adopted, its Planning policies, zonings and development proposals will be used to determine planning applications throughout the District. This GI Plan, will assist with the development of the LDP and Planning Service by identifying open spaces that provide important GI functions.
- **Draft Programme for Government Framework 2016-2021, (Northern Ireland Executive, 2016)**, aims to address the major issues facing society and to make a difference to things that matter most to people. This GI plan will assist with the delivery of 12 of the 14 outcomes and 18 of the 42 indicators for the Programme for Government.
- **Sustainable Water, A Long Term Water Strategy for Northern Ireland (2015-2040)** (Department for Regional Development, 2016), aims to provide sustainable water solutions, which promotes the use of green and blue spaces to sustainably manage flood risk.

01 Introduction

1.4.3 Green Infrastructure Situational Analysis

The Stakeholder Group and the preliminary results of the Green Space Audit for the LDP identified a number of strengths, weaknesses, opportunities and threats (SWOT) associated with the provision of green and blue spaces within the district.

The SWOT analysis (Appendix 3) will inform the micro considerations associated with the GI Plan, for example, to expand the greenway network and increase the quantity and quality of green spaces.

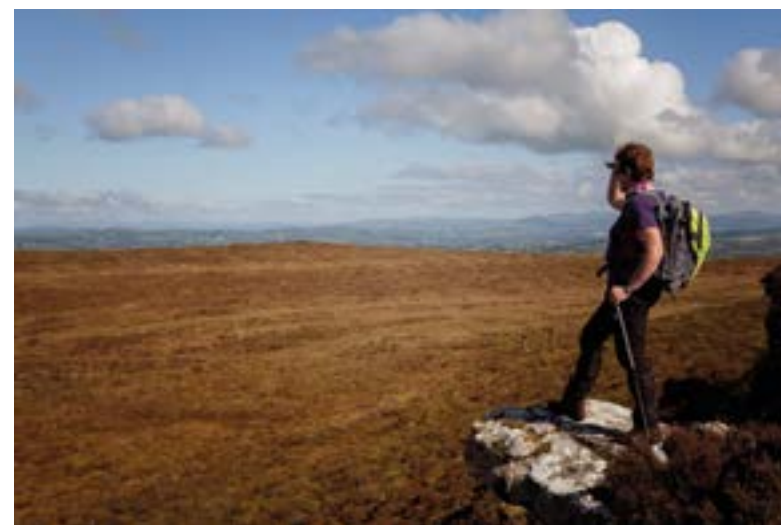
Also, the political, economic, social/cultural, technological, environmental and legal (PESTEL) macro considerations were reviewed by a PESTEL analysis (Appendix 3) associated with the GI Plan. For example, the effects of BREXIT and a potential City Deal.

Collectively, these tools allowed a comprehensive review of internal and external factors, known as a Situational Analysis. These will be appraised, to form the basis of the GI action plan in 2019.

Subsequently, a decision matrix analysis tool will be applied to determine if these actions are applicable.



Foot bridge, Sion Mills



Sperrins and Killeter Walking Festival





2.1 Vision

The GI plan aims to meet the District's future economic, environmental and social needs.

'By 2032 the environmental, economic and social benefits of Green Infrastructure will be valued and maximized by all.'

The GI vision will be managed and delivered through the commitment and involvement of the public, private and voluntary sectors, working in partnership with each other.

The District's GI Plan will encompass existing and new green spaces, both urban and rural, to provide a network of high quality, well located and multi-functional green and blue spaces. It will support active and passive recreation, enhance ecosystem services, further the conservation of biodiversity, improve active and sustainable transport network.

It will connect urban areas, rural areas and adjacent districts. It will be delivered at a range of scales, from local, regional and national levels.

2.2 Aims

Outlined below are the four key aims:

1. Increase awareness, appreciation and use of Green Infrastructure;
2. Integrate Green Infrastructure principles into policy and decision making;
3. Protect, improve and increase Green Infrastructure through good design, planning and asset management; and
4. Deliver Green Infrastructure's full potential for people and place, developing economic prosperity, biodiversity and responding to climate change.

2.3 Values

For the district to realise its strategic vision it has developed four core values:

1. Leadership;
2. Sustainability;
3. Innovation; and
4. Collaboration and Partnership.

3.0 Green Infrastructure Themes

GI can provide economic, environmental and social benefits, from enhancing biodiversity, responding to climate change, tourism opportunities and improving access to green and blue spaces for local people.

The GI Plan contains two categories of themes for implementing the plan (Figure 3.1), cross cutting themes and key themes.



Sailing, River Foyle (Source, Loughs Agency)

3.1 Cross cutting themes

There are three cross cutting themes: (Figure 3.1)

- **Health and Wellbeing;**
- **Communication and Engagement; and**
- **Natural Capital.**

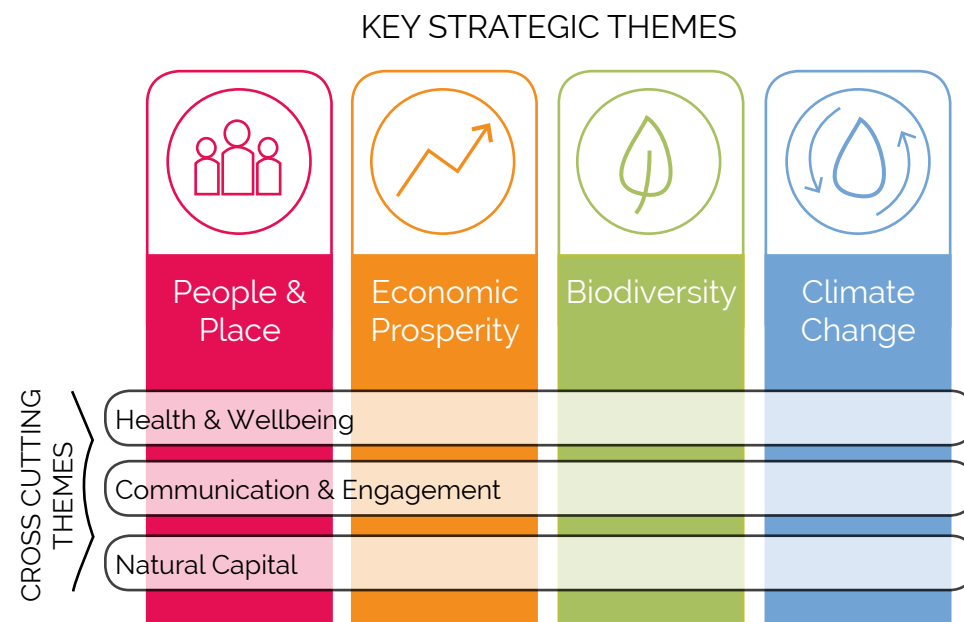


Figure 3.1 Cross cutting and key strategic themes

3.1.1 Health and Wellbeing

Each of the key themes will have the following priority:

Define and develop the health and wellbeing benefits of Green Infrastructure for our environment and people.

GI protects the environment through regulatory ecosystem services, for example, climate regulation, carbon storage, flood alleviation, regulating air and water quality. Public Health England (2018) reports that long term exposure to poor air quality accounts for as many deaths as alcohol and the Royal College of Physicians estimate that 40,000 deaths / annum are attributed to air pollution, at an annual cost of £20 billion (National Audit Office, 2017).

Research states that around one in four people will suffer some form of mental health illness at some point in their lives (Forest Research, 2010). Several studies have reported the positive effects of green spaces on psychological well-being, including stress reduction and mental health improvements. Also, the positive health benefits of viewing natural landscapes on stress levels and recovery from stress or mental fatigue. It is also proven to help physical recovery from illness and long-term overall improvement on people's health and well-being are reported (Forest Research, 2011).

Green spaces have been shown to independently promote physical activity, thereby enhancing the health profile of the people who use those spaces. Regular exercise, including walking, can reduce the negative effects of many major health threats, for example, obesity, type 2 diabetes, coronary heart disease and respiratory disorders (Forestry Research, 2010). The UK Health Forum (2014) estimated in 2014 that 62% of adults are overweight or obese, which is projected to increase to 70% by 2034. Public Health England (2018) reports that the cost

of people being overweight and obesity related ill health to the NHS in the UK in 2014/15 was an estimated £6.1 billion / annum. Natural England (2011) reported that a national cross-sectional study in the UK found that people who live within 500 metres of accessible green space are 24% more likely to meet the recommended 30 minutes of exercise levels of physical activity.

Parks and other green spaces create opportunities to relax, exercise and experience natural surroundings. Vivid Economics (2017) estimated that the total value of avoided healthcare costs due to London's greenspace is estimated at £950 million/annum, from reduced disease risk due to higher levels of physical activity and improved mental health due to access to parks. Parks and other types of green spaces provide opportunities for residents to increase levels of physical activity in spaces where exercise and recreation can be conducted free of charge. This evidence supports the case for investment in green infrastructure to increase physical activity, which in turn results in reduced costs to the NHS.

3.1.2 Communication and Engagement

This is a vital cross cutting theme, linking to the aim to, 'increase awareness, appreciation and use of GI'. Each key theme will have the following priority to ensure that this cross cutting theme and associated aim is achieved:

Develop awareness, understanding and appreciation of the value of green infrastructure to create change at a policy, organisational and individual level.

3.1.3 Natural Capital

Natural Capital is a vital cross cutting theme, linking to the aim to; 'integrate GI principles into policy and design'. Each key theme will have the following priority to ensure that this cross-cutting theme and associated aim is achieved:

Define the natural capital and value of Green Infrastructure as an evidence base to justify future development.

Natural capital is the stock of natural assets that provide benefits for people. These assets are parks, woodlands, minerals, soil, air and water and the natural processes that underpin essential ecosystem services. Ecosystem services (Figure 3.2) are the essential benefits that people obtain from the environment, such as, food production, clean water and air. Nature is now considered a form of capital, which we need to protect into the future as it provides us with a multitude of benefits and performs important functions, for example, temperature regulation and flood control. To make a long-term business case for GI investment, it is necessary to identify the benefits that GI can contribute towards public sector statutory obligations and Programme for Government. Also, there is a need to demonstrate the benefits of GI to the stakeholders in the private sector.

The Office for National Statistics (2017a) state that Gross Domestic Product (GDP) excludes services provided by natural capital. The Natural Capital Committee recommends the use of a natural capital accounting framework as a fundamental mechanism if natural capital is to be mainstreamed in decision-making. This will help organisations make better decisions about the value of the services provided by the natural capital assets (or green infrastructure) that they own and manage (Greater London Authority, 2015). A Natural Capital Account can help to inform and improve decision-making by framing public green spaces as economic assets, and highlighting the range and value of their benefits

Vivid Economics (2017) found that for every £1 spent by local authorities and their partners on public green spaces, Londoners enjoy at least £27 in value. This investment is exceptional value for money. Also, they estimated in Sheffield (Vivid Economics, 2016) that for every £1 spent on maintaining the parks, £36 of benefits are generated.



Figure 3.2 Ecosystem Services, source waterways Ireland 2016

3.2 Key Themes

There are four Key Strategic Themes (Figure 3.3):

- **People and place;**
- **Economic prosperity;**
- **Biodiversity; and**
- **Climate change;**

These themes are outlined in further detail in sections 3.3-3.6. Each of the four key themes will outline the following:

- **Strategic aim** – the principal aim for each key theme;
- **Strategic priorities** – the high-level priorities for each key theme; and
- **Potential actions** – a summary of potential key projects/proposals, which will assist with the improvement of each theme.

The potential actions proposed will aim to be cross-cutting and deliver benefits for multiple themes. A detailed Action Plan will be produced in 2019, to deliver the GI Plan.

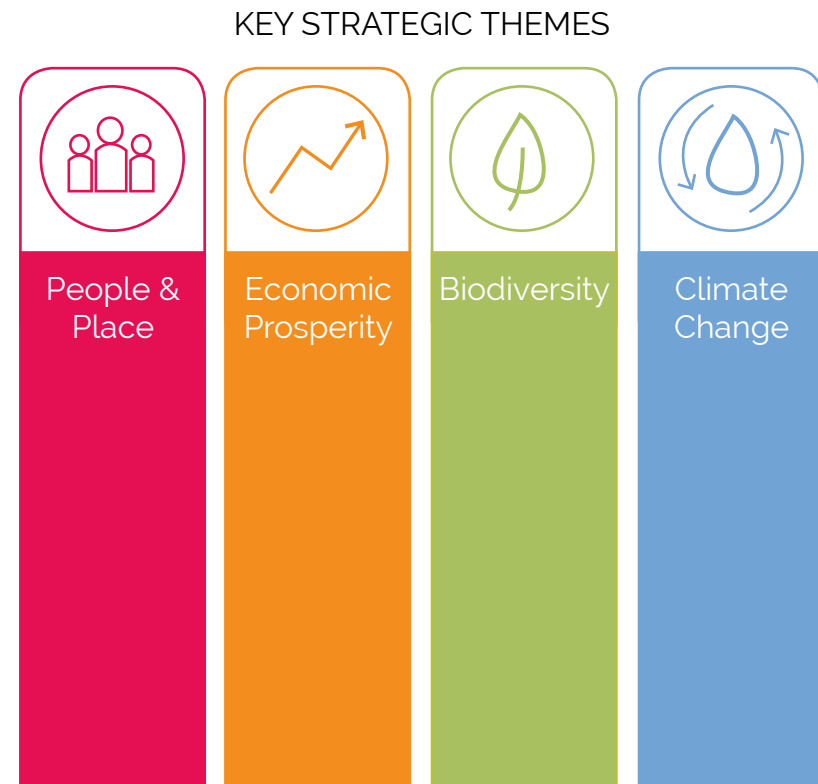


Figure 3.3. GI Key Strategic Themes

PEOPLE & PLACE



3.3 People and Place

It is important to provide a diverse network of attractive, sustainably managed and multifunctional GI assets, which will enhance the quality of life of the citizens of the District.

The Council's Strategic Growth Plan's Environment and Regeneration Pillar (Derry City and Strabane District Council, 2017), outlines a number of key actions that are linked to the GI Plan, to include enhanced greenway provision, sustainable transport and leisure facilities. This theme aims to continue to invest in high quality green space parks, play areas and expand the greenway network. This will help people to become more active and reap the health benefits associated with exercise by:

Multi-functionality of our existing green spaces;

- Sustainably manage our existing green spaces;
- Connectivity between green and blue spaces, with ecological and recreational corridors, to aid the movement of people and species, to strengthen the GI network;
- Connectivity between urban and rural areas;
- Enhancing the diversity of informal and formal recreational potential of green spaces;
- Quantifying the natural capital benefits of green and blue spaces;
- Understanding, appreciating and valuing green and blue spaces for health and well-being.

Fields in Trust (2018) argue that parks and green spaces are the most universal of all public services. The UK benefits from more than 27,000 public parks, sports fields, nature reserves, playgrounds and pocket parks. As publicly owned assets, they have something to offer all sections of the community from pre-school children through to retired adults.



Castle Site, Castlederg



Newtownstewart

3.3 People & Place



3.3.1 Green & Blue Spaces

Green and blue infrastructure includes multi-functional spaces, for example, parks, (Figures 3.4 and 3.5) gardens, agricultural fields, hedges, trees, woodland, green roofs, green walls, rivers and ponds (Figure 3.6).

Blue infrastructure is defined as landscapes that are linked to water, for example, loughs, rivers, lakes and canals. Waterways (blue ways) provide multi-functionality by providing economic, social and environmental benefits. They offer a valuable habitat for a variety of species, a recreational resource and contribute to the health and wellbeing of our district. Also, Sustainable Urban Drainage Systems (SUDs) can help to manage the quantity and quality of surface water runoff, whilst providing an attractive public amenity.

A good example of this is the Shannon Blue Way which allows guided and unguided paddling and walking along the Lough Allen Canal and Shannon River from Carrick on Shannon via Leitrim village and Battlebridge to Drumshambo.

The Foyle catchment area is a prime location for an iconic Blue Way development to include the further development of a canoe trail, dingy sailing trail, sail cruising trail, snorkelling and shoreside greenway. A Blue Way brand should act as a catalyst for the diverse range of organisations to form a consortium to both develop and promote the waterway as a water-based tourism destination (Outdoor Recreation Northern Ireland, 2015a).

The River Foyle is a strong resource for water-based activities, for example, canoeing, rowing, sailing and fishing. Facilities for this include jetties, slipways, canoe steps, fishing stands, pontoons and shore access.

The District has a wide range of green spaces, ranging from parks, woodlands, allotments, playing fields, street trees and agricultural land. Green spaces are fundamental to contributing to a high quality of life for those living, working and visiting the district. They provide habitats for wildlife, active and passive recreation and help mitigate the impacts of climate change. Parks of varying sizes have the potential to strengthen the district's GI network.

We are strongly connected to nature and extensive research suggests that green spaces and the natural environment can have a positive impact on physical and mental health, as it provides valuable spaces to meet, interact, exercise and relax (refer to section 3.1.1).

Recent research has linked the presence of green space to reduced levels of inner-city crime and violence, a stronger sense of community and improved academic performance. Everyone requires access to nature and has a role to play in supporting the environment for future generations.

Derry and Strabane's existing GI features encourage a range of leisure activities, for example, canoeing, rafting, angling, sailing, horse riding, hiking, cycling, walking and running. Increasing greenways, recreational trails and accessible greenspace will encourage and enable people to live healthier, more active lifestyles and provide further benefits in reducing carbon emissions and connections for people and wildlife. Implementing these GI features will benefit the individual and the community physically, psychologically, emotionally and socio-economically.

3.3.2 Play

Play is critical to the development of children's development and supports positive growth across a range of developmental areas including physical health and wellbeing, social development, intellectual growth and learning, practical skills and development, personal resilience and establishing a connection to wider society (Play England, 2018).

The United Nations Convention on the Rights of the Child came into force in the UK in 1992, which enshrined the child's right to play through Article 31 of the Convention. This obliges all government departments and local councils to provide play opportunities for children, including those living with a disability and those living in marginalised, vulnerable or disadvantaged situations with safe, accessible and inclusive spaces for play and socialisation.

Despite the importance of play, children are becoming increasingly alienated from the natural world, with a rise in the number of young people opting to stay indoors to play computers and watch TV.

Barriers to play include safety (parental concerns, increased traffic that restricts street play opportunities and the ability to access neighbourhoods independently), resources within a community (lack of open green spaces and play areas) and a reduced tolerance of children playing outside (Hesketh et al., 2017).

Children under 16 represent 22% of the District's population. Outdoor children's play facilities vary from formal equipped children's playgrounds to kick-about areas. The district currently has 83 play provision sites (Figure 3.4).

Natural play in wild settings provide fun, freedom, health and well-being benefits for children. It can be therapeutic for conditions such as for depression, anxiety, obesity and attention deficit disorder. (Figure 3.5)

Open spaces should be designed to cater for the recreational needs of people of all ages and abilities. Play should include formal and informal opportunities and should extend to adults, to encourage relaxation, connection and exercise in the natural environment.

Access to good quality, well-maintained open spaces improves our physical and mental health by encouraging and allowing people to walk more, play sport or simply enjoy a green and natural environment. Reducing the number of sedentary individuals in the population by 1% could reduce morbidity and mortality rates. It is valued at £1.44 billion for the UK (Lawton et al, 2010).

An increase in obesity is linked to sedentary lifestyles and a reduction in outdoor activity. Public Health England (2018) estimated that only 10% of pre-school children meet the Chief Medical Officer's guidelines for physical activity of at least 180 minutes of activity spread throughout the day.

It is the responsibility of society as a whole to ensure our children and young people have access to the widest possible range of play experiences allowing them to understand the world around them and become confident individuals.



Figure 3.4 Ballyarnett Playground



Figure 3.5 Forest Schools (Source The Telegraph)

3.3 People & Place



3.3.3 Greenways

Greenways are sustainable travel corridors, which can be shared use or segregated walking and cycling infrastructure. They are vitally important due to their multi-functionality, for example, sustainable travel facilities, green corridors, improving urban mobility and event spaces. These functions provide a range of benefits to include a modal shift, improved air quality (reduced vehicular traffic), improved health and wellbeing (active lifestyles) and decreased urban congestion (less road traffic).

Within the District, there is an established network of greenway, walking and cycling routes of approximately 90 km. The GI plan will encourage the expansion of greenways (Figure 3.6), to encourage more walking and cycling, active travel and increase modal shift. This includes the development of a network of cycleways, pathways and greenways across the district, as well as the provision and improvement of public access to open space and other green and blue spaces.

Travel attitude behavioural change will be encouraged through events, as well as ongoing community and stakeholder engagement. New walking and cycling infrastructure, along with engagement, will facilitate a modal shift away from private cars and encourage healthy lifestyle choices to improve health and wellbeing.

The Education Authority is developing safer routes to schools, to encourage pupils to walk and cycle to and from school. Many employers have adopted green travel plans, which encourage car sharing, public transport and cycling. Improving connectivity between residential, education and employment areas, which are well served by a range of sustainable travel modes, would encourage active lifestyles, and reduce air pollution. This will deliver significant community health benefits.

Together, these measures will help to deliver a liveable district that offers a better quality of life for all its citizens. The biggest opportunity is to take responsibility ourselves, to change our own behaviours and priorities.

For most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. For example, walking or cycling instead of travelling by car.

There is a need to build incidental activity into everyone's daily life, for example, through creating safe and attractive environments that enable anyone of any age or ability to travel actively (Public Health England, 2018).

Sustrans (2017) conducted cycling research in Belfast and found that 6.7 million bike trips were made in 2016. This equated in a cost saving to the NHS of £392,000 (equivalent to 17 nurses). Also, they calculated that for each mile cycled, there was a net benefit of 82p / mile to the individual and the environment, based on travel time, vehicle costs, health, congestion, infrastructure, local air quality and greenhouse gases.

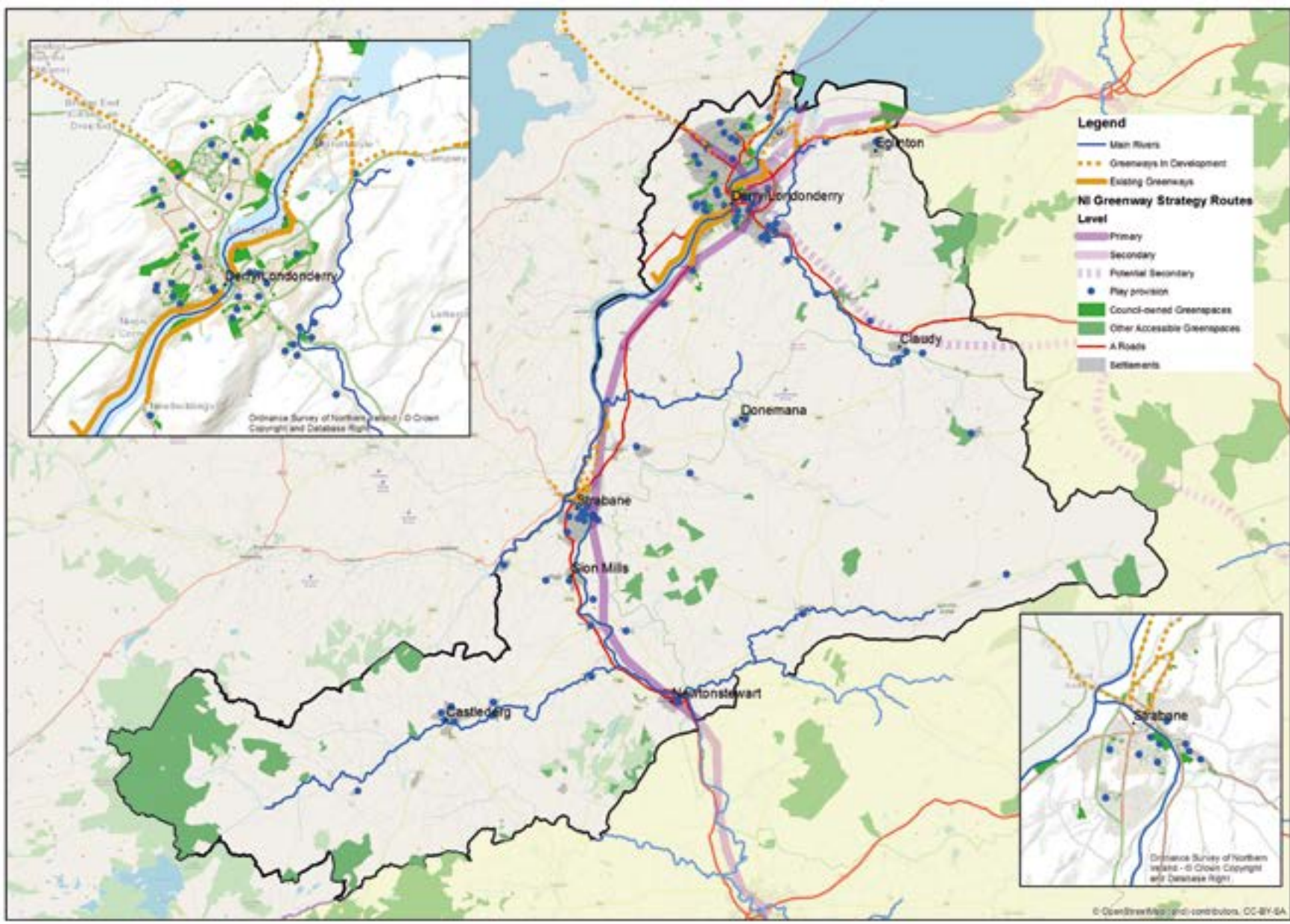


Figure 3.6 - A map of green and blue spaces in the district

3.3 People & Place



People and Place Strategic Aim: GI enhances our quality of life	
Cross Cutting Priorities	Potential Actions
Communication and Engagement: Develop awareness, understanding and appreciation of the value of green infrastructure to create change at a policy, organisational and individual level	Update Council's website with details of green space provision
Health & Wellbeing: Define and develop the health and wellbeing benefits of Green Infrastructure for our environment and people	Research the potential benefits of activities on water & evaluate health benefits
Natural Capital: Define the natural capital and value of Green Infrastructure as an evidence base to justify future development	Calculate the value of green space provision for the District
Key Strategic Priorities	Potential Actions
Provide high quality multi-functional green & blue spaces.	Retain Green Flag status at Brooke Park and extend to St Columbs Park
Develop quality play provision	Review existing play provision & identify need for additional play provision by commissioning a new Play Plan
Develop an active & sustainable transport network	Deliver the EU Interreg cross border greenway project, connecting the district with Muff, Buncrana and Lifford

Figure 3.7 - People and Place strategic theme's, aims, priorities and potential actions.



ECONOMIC PROSPERITY



3.4 Economic Prosperity

The natural environment is fundamental to economic growth. Over recent years, the District has benefited from significant investment in physical regeneration, which has led to economic, environmental and social transformation, for example, through the construction of the Peace Bridge, UK City of Culture 2013 and riverfront greenways.

By maintaining a healthy environment, a range of benefits are provided:

- The aesthetic quality is improved, acting as a catalyst for economic growth, attracting inward investment, businesses and generating employment;
- The need for healthcare is reduced;
- There is increased tourism potential including the creation of standout and unique selling points;
- Improving mitigation and adaptation to climate change; and Improved
- Land and property value is increased.

When designed, planned and managed GI can offer multifunctional approaches to achieving economic prosperity can address practical challenges. For example, enhancing a river corridor with a path network can promote opportunities for water-based activities and opportunities for tourism, attracting visitors and increasing employment.

Economics for the Environment Consultancy and Centre for Regional Economic and Social Research (2013) investigated that GI, whilst not necessarily a driver of economic growth, can act as a catalyst for economic growth, by attracting inward investment and generating employment. The Office for National Statistics (2018a) reported that proximity to green space has been shown by a number of studies to positively affect the value of house prices, showing that households value a range of amenities provided by parks.

Fundamentally, green infrastructure makes cities better places to visit, live and work in. The natural environment provides a strong tourism asset. The investment in GI makes economic sense, as a green space can provide multiple benefits. It provides an integrated way to manage our natural capital. It is as vital and necessary as grey infrastructure (man-made constructed infrastructure). Historically, GI was considered in isolation, rather than an integral part of the urban infrastructure, which the district prosperity and viability depends upon. Therefore, the potential benefits of GI have not been fully realised or valued. We need to rethink our relationship with GI, by planning, designing, managing and funding the District's GI, similar to other grey infrastructure. Protecting, enhancing and providing GI should be considered in all development decisions. It should be considered at project conception, to strategically identify opportunities to provide, increase and protect GI.

The private sector has an important role to play in investing in GI. It provides an opportunity to maximise the range of environmental, social and economic functions of a development site. Also, GI provides a range of provisioning services, for example, pollination, food and fuel products for businesses.

The Community Plan's Environment and Regeneration Pillar (Derry City and Strabane District Council, 2017) outlines a number of key actions that are linked to GI Plan in relation to regeneration and tourism. A commitment to a City Deal for Derry and District will help to deliver on the key catalyst projects outlined in Derry City and Strabane District's Community Plan (2017) and GI Plan.

3.4 Economic Prosperity



3.4.1 Regeneration

Local economic regeneration is strongly related to benefits of green space, for example, economic growth and investment, quality of place (including visual amenity), recreation, leisure and tourism. The provision of high quality, well-maintained green space can have a positive effect on local activities and business. It improves an area's image and the confidence of both local inhabitants and potential investors. GI can improve the aesthetic quality of an area, which can increase inward investment, attract business and customers and encourage people to spend more time and money in the area (Landscape Institute, 2009).

Green infrastructure can typically provide lower cost solutions, to environmental management, for example, carbon sequestration, improved air quality and reduction of flood risks. This will lead to a reduction in the expenditure required to repair any damage caused by extreme events (Economics for the Environment Consultancy and Centre for Regional Economic and Social Research, 2013).



Historic City Walls



The Guildhall and Peace Bridge

3.4.2 Tourism

The natural environment provides an important asset for tourism. The Derry City and Strabane District Tourism 2018-2025 - A New Level of Ambition (Derry City and Strabane District Council, 2018b), outlines that the District's key proposition is that it is located where the Wild Atlantic Way meets the Causeway Coastal Route, which is an ideal destination and a perfect hub for exploring. The City has a number of important key tourism assets, for example, the River Foyle with a marina and boat trails and the historic Walled City. These assets, in conjunction with a number of key tourism events. (Halloween and Foyle Maritime Festival) generate significant revenue. The UK City of Culture 2013 attracted 1 m visitors and participants over 400 events. Subsequently, there has been an 11% increase in tourism employment from 2013-2015, with 4,685 tourism jobs, which the tourism plan aims to build upon and create an additional 1,000 tourism related jobs by 2025 (Derry City and Strabane District Council, 2018b).

Visitors are seeking authentic experiences that will help them connect emotionally and memorably with destinations. Linked to Council's Tourism Strategy (Derry City and Strabane District Council, 2018b), the District offers a variety of activity and adventure allowing people to take the time to enjoy and engage with nature, angling, kayaking, sailing, walking and cycling. Future Analytics et al. (2018) outlined that walking, cycling and water-based activities are becoming increasingly popular amongst visitors and are becoming an important tourism product, increasing dwell time, extending the tourism season and increasing regional and rural spending. Therefore, GI is a critical component of Ireland's tourism. They found that tourism activity around waterways acts as a catalyst for entrepreneurs to provide restaurants, convenience stores, recreational services and indeed holiday accommodation throughout rural and urban Ireland.

Outdoor Recreation Northern Ireland (2015b) outlined that walking is considered one of the most important activities for tourists with 19% of day visitors and 25% of overnight visitors taking part in walking or hiking. The greatest economic benefit to an area generated by a long distance walk for example, the International Appalachian Trail will be derived from an increase in revenue to accommodation providers, restaurants and local shops. The introduction of new facilities and services (trails, adventure play and enhanced visitor services) can stimulate an increase in tourists. Greenways could create a high quality destination for visitors and result in a multiplier effect, with social and economic regeneration in rural areas, which can increase visitor length and spend in the district. This has significant potential to attract a new profile of visitors in the medium to long term.



Ebrington Square, Halloween

3.4 Economic Prosperity



3.4.3 Food Economy

Creating space for food production through allotments, community gardens and orchards, increases access to healthy food, provides educational opportunities, contributes to food security, prompts to more active healthy lifestyles and reconnects communities with their local environment. Through urban food production and community gardens, this can assist in educating school children and engage the interest of young people to address the disconnect between the production and consumption of food. Local food production can often reduce food miles and helps to support the local economy. Derry City and Strabane District Council's Food and Drink Strategy (2019), outlines that from late 2015-2017, 20 new food and drink businesses were launched within the district. It has ambitious targets for growth of the sector, to link local food production to the food industry and the artisan food offering within the District, to contribute £33 million to the tourism economy by 2025.

Sustainable food production is a vital component of creating a circular food economy, which helps the district to become more resilient to future food insecurity (Figure 3.8). Green infrastructure includes land in productive use in the countryside. Managing this land provides employment opportunities and investment to reinstate degraded land, which can restore ecosystems and reduce land management costs. Investment can provide new opportunities for agricultural diversification for food and non-food crops, as well as providing the resource to generate renewable sources of energy, including growth of biomass and biofuels. Diversification of agricultural production can also be encouraged to meet local market demand, and produce added value, regionally distinctive food and drink.



Figure 3.8 (Source Bristol's City Council, 2013) Good Food Plan)

3.4.4 Skills, jobs & volunteering

GI has the potential to create jobs, diversify local skill-sets and stimulate activity in the labour market. We want to connect more people, particularly young people with nature, develop career paths and increase volunteering.

The green space sector (public parks departments, nature reserves, botanical gardens, landscape services and architectural services) directly employ 122,000 people in the UK, which represents 5% of the job market (Economics for the Environment Consultancy and Centre for Regional Economic and Social Research, 2013).

Green infrastructure provides jobs on site in construction, maintenance and operation, and off site in parts of the tourism sector that rely primarily on use of green spaces.

By creating training and volunteering opportunities, this can extend local people's skills set and future employment prospects. For example, The Conservation Volunteers offer a range of horticultural training courses and volunteering opportunities within publicly owned green spaces which can increase community ownership of a green space.



Business innovation in rural areas

3.4 Economic Prosperity



Economic Prosperity Strategic Aim: GI is a key aspect of Economic Growth	
Cross Cutting Priorities	Potential Actions
Communication and Engagement: Develop awareness, understanding and appreciation of the value of green infrastructure to create change at a policy, organisational and individual level	Educate children on sustainable food production through engagement programmes
Health & Wellbeing: Define and develop the health and wellbeing benefits of Green Infrastructure for our environment and people	Re-connection with food growing & circular food economy
Natural Capital: Define the natural capital and value of Green Infrastructure as an evidence base to justify future development	Calculate the potential value of GI for tourism
Key Strategic Priorities	Potential Actions
GI is a key component of regeneration projects	A green infrastructure screening matrix (checklist) is developed
Green and blue spaces are a driver for tourism and economic growth	Develop a green tourism product using existing GI assets as visitor destinations.
GI supports a local circular food economy	Deliver an iconic permaculture demonstration project
GI provides opportunities for life long learning and employment	Create employment pathways

Figure 3.9 - Economic Prosperity strategic theme's, aims, priorities and potential actions. .



BIODIVERSITY



3.5 Biodiversity

Biodiversity provides a range of environmental, social and economic benefits that people derive from nature, which are referred to as ecosystem services (Figure 3.2) (essential natural services for our survival) to include:

- Provisioning services are the products obtained from ecosystems to include food, fresh water, clean air, energy, fibre and medicines.
- Regulating services are the benefits derived from the regulation of ecosystem processes, for example, climate regulation, natural hazard regulation, water purification, waste management and pollination.
- Habitat services highlight the importance of ecosystems that provide habitats for wildlife.
- Cultural services include non-material benefits that people obtain from ecosystems, which are crucial for our well-being to include recreational resources and aesthetic value.

The District has 41 international, national and local designated sites (refer to Appendix 2), with two Ramsar sites, one Special Protection Area (SPA), five Special Areas of Conservation (SAC), 25 Areas of Special Scientific Interest (ASSI), three National Nature Reserves (NNR), one Area of Outstanding Natural Beauty (AONB) and four Local Nature Reserves (LNR) (Appendix 2 and Figure 3.10). This biodiversity enriches the District and offers a range of benefits, including important habitats, recreational provision, health improvements, flood risk reduction and community cohesion. However, biodiversity is threatened by many factors, including habitat loss, pollution, climate change and invasive alien species. The loss of biodiversity affects these essential ecosystem services.

The UK signed the Convention on Biological Diversity (CBD) in 1992, to halt the loss of biodiversity. Subsequently, the UK Biodiversity Action Plan (BAP) was published in 1994 (Department of Environment, 1994), with the adoption of the regional Northern Ireland Biodiversity Strategy in 2002. The UK BAP proposed that Local Biodiversity Action Plans (LBAP) should be prepared to implement the UK BAP at a local level. Therefore, Council established the Foyle Biodiversity Partnership in 2007, a local partnership of government departments and non-government organisations, to produce the first Derry and Strabane LBAP 2008 – 2013 (Derry City Council, 2012).

Since the publication of the first LBAP for the district, there has been several legislation and policy changes relevant to biodiversity. The Wildlife and Natural Environment (NI) Act 2011 introduced a new statutory duty upon: *'every public body, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions'*.

The Local Government Act (NI) 2014 introduced the creation of a Community Plan by local authorities to improve the long-term social, economic and environmental well-being of the district. Therefore, Council aims to progress towards developing a holistic ecological functioning landscape (green infrastructure). The GI Plan will prioritise actions to secure the future of the district's biodiversity, incorporate GI into the LDP and will assist with the delivery of key actions within the Community Plan (Derry City and Strabane District Council, 2017).

Outlined below are the main global threats to biodiversity:

- Habitat loss and fragmentation
- Invasive alien species
- Climate change
- Pollution.

3.5 Biodiversity

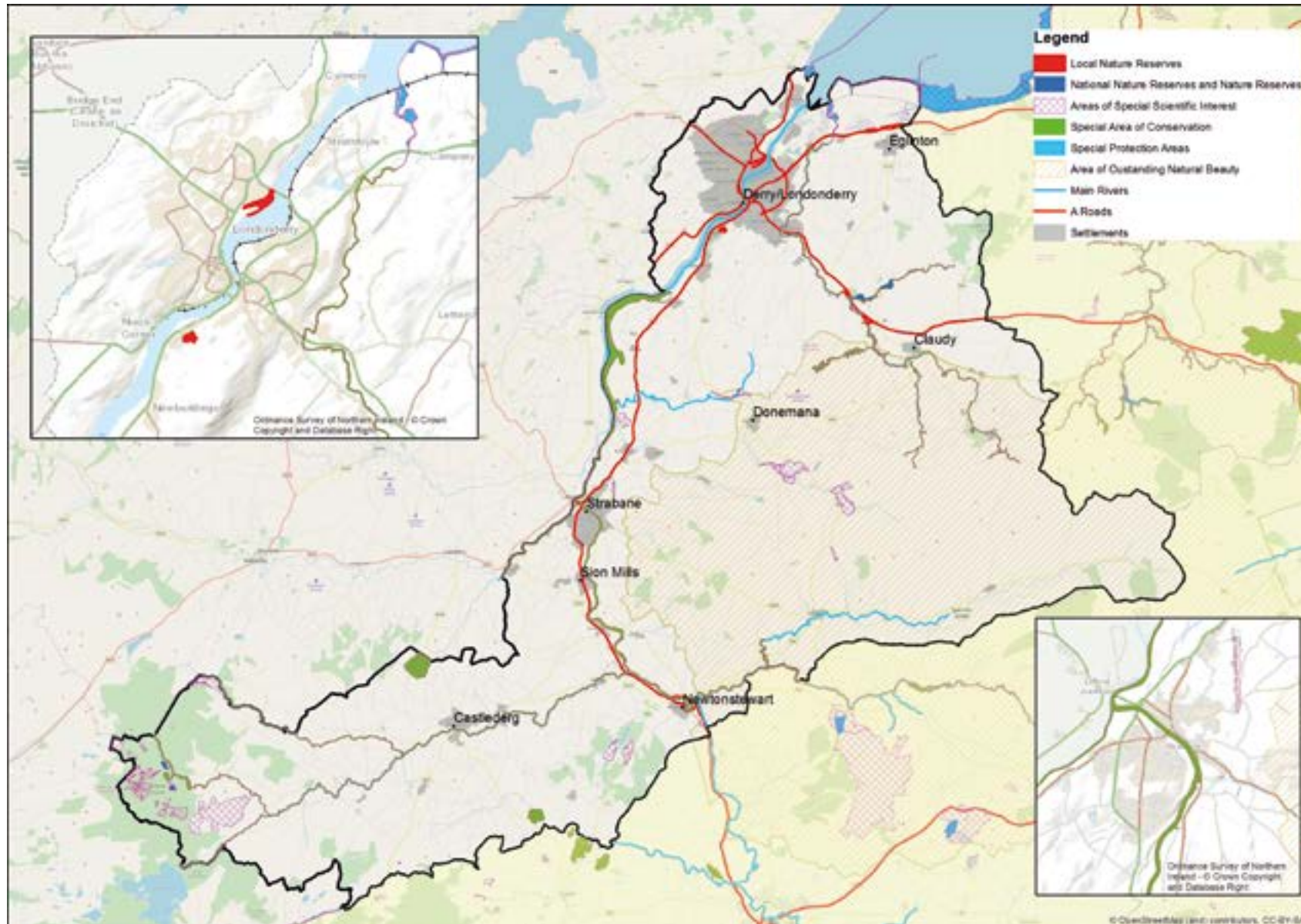


Figure 3.10 Map of designated sites

3.5.1 Habitat loss & fragmentation

Habitat loss is the greatest threat to biodiversity worldwide. All habitats are under threat from loss, damage or fragmentation. Many species are now living in smaller, fragmented pockets of their previous habitat range. Therefore, they are more vulnerable to population decline. Developments, new transportation infrastructure, intensive agricultural practices, drainage of bogs, commercial forestry plantations, wind turbine farms, peat cutting and changes in farming practice are all contributing to habitat loss and fragmentation. Biodiversity can exist alongside development through proper planning.

Green infrastructure is viewed as one of the main tools to tackle threats on biodiversity resulting from habitat fragmentation, land use change and loss of habitats. It allows a holistic review, identifies the potential for strengthening and protecting areas, connecting habitats and green spaces to facilitate the movement of species through linear corridors and 'stepping stones'. The management of linear features and corridors for species movement may become increasingly important for species movement, habitat expansion and enables south-north movement of species as the climate warms. Wildlife corridors are important in helping to overcome habitat fragmentation and to ensure that populations of key species do not become isolated or extinct.

We will identify local priority habitats and species under threat and prioritise actions to secure the future of the district's biodiversity. We aim to design wildlife habitat into grey infrastructure, with green roofs, walls, birds and bat bricks. Also, we will manage our green spaces to increase functionality.

3.5.2 Invasive alien species

Invasive Alien Species (IAS) are non-native species that have been (un)intentionally introduced to Northern Ireland from around the world, whose introduction and spread threatens biodiversity. Once established they pose a threat to the environment, economy or society (human health), which can be difficult and expensive to control. IAS are estimated to cost the EU at least €12 billion per annum. IAS is a cross-cutting issue, which requires a wide range of stakeholders to be effective management (Department of Environment, 2013).

IAS is a growing environmental threat to native biodiversity as a result of competition, predation, introduction of diseases, changes to habitats and food webs. Japanese knotweed, Giant hogweed, Himalayan balsam, Rhododendron and grey squirrels are the key IAS within the district. Recently, Ash Dieback Disease was introduced to Northern Ireland in 2012, through the import of infected young ash trees, which affected several sites within the district. There are a number of national strategies and legislation (IAS Strategy for Northern Ireland; Wildlife (NI) Order 1985), European regulations (Regulation on the prevention and management of the introduction and spread of IAS) and international conventions (CBD) that have measures to address the introduction and spread of IAS. IAS strategies should be developed to include annual surveys, control programmes, biosecurity and contingency planning. Also, a varied species mix can improve the delivery of ecosystem services; improve the aesthetics, the resilience of trees to the combined threats of tree pests, diseases and climate change (Trees for Cities, 2018).

3.5 Biodiversity



3.5.3 Climate change

Climate change is increasing the changes in species composition and local extinctions for all habitat types. Climate change shifts seasonal timing, migration patterns, growth, productivity, species ranges and habitat location, which affects biodiversity, agriculture, forestry, and fisheries. Many species will not be able to migrate or adapt fast enough to keep pace with projected rates of climate change (Fischer et al, 2018).

The scale of local extinctions and colonisations in response to changes in climate will be dependent on the ability of individual species to physically disperse. The rates of colonisation will depend on whether there are suitable habitat conditions present for a species to thrive. Species will not be able to move to new areas if there is insufficient suitable habitat in good condition available. The key is to safeguard ecosystem services delivered by species and habitats.

North Western River Basin Management Plan 2015-21 (Department of the Environment, 2015b) outlines the environmental implications of climate change in Northern Ireland. Increased soil moisture deficits and drying, will have consequences for species, habitats and soil organic carbon. Wetland habitats (bogs) are particularly sensitive to changes in soil moisture. Widespread historical drainage, afforestation and adverse management have resulted in an estimated 88% of peatlands in Northern Ireland showing signs of degradation in 1990. They represent 10% of the UK's land area and store over 3 billion tonnes of carbon. An estimated 15% (206,400 hectares) of Northern Ireland's land is covered by peaty soils, including most of the uplands. In addition, a warmer climate increases the likelihood of pests and diseases that were previously limited by climate (notably cold winters) to persist and disperse due to higher overwinter survival rates. Higher temperatures will increase the suitability of the UK's climate for invasive mosquito species, facilitating invasion by new species that can transmit diseases in the long term. Lyme disease may shift in altitude and

incidence in the UK in response to climate change (ASC, 2016).

Low flow conditions can reduce dilution of pollutants. High flows can cause runoff of sediment and pollution, which can cause significant ecological damage, for example, to fish spawning beds and water quality. Rising sea levels will affect low-lying coast and transitional waters, which may cause evolutions in salt marsh and intertidal habitats (Department of the Environment, 2015b). Coastal habitats are extremely valuable for wildlife and provide a range of vital ecosystem services, including protection from coastal flooding and storm surges. The coastal protection provided by saltmarsh has been demonstrated by modelling, which suggests that up to 50% of wave energy is dissipated in the first 10 - 20 m of vegetated saltmarsh. An 80 m width of saltmarsh has been estimated to reduce the height of seawall defence required from 12 m to 3 m resulting in capital cost savings of £2,600 - 4,600 per metre of seawall (ASC, 2016).



The River Foyle

3.5.4 Pollution

All members of society are responsible for polluting the environment and by examining our lifestyles, the products we use and the companies we support, individuals can make a difference.

Poor water quality can pose a health risk for people and ecosystems, due to the presence of bacteria, nutrients and contaminant levels. Water quality is an essential ecosystem service for society and the economy. Certain types of land use management can cause materials (sediments and herbicides) to run off the land and drain into the river. SUDS can assist with managing the quality of surface water runoff.

Air pollution can have damaging effects on human health and ecosystems. Poor air quality occurs when levels of pollutants in the air reach high enough concentrations to endanger human health and the environment, for example, water quality, soils, plants, sensitive habitats and animals. Ferranti et al. (2018) stated that within the UK, poor outdoor air quality is linked to 50,000 deaths/annum. The most vulnerable are children, the elderly and those with pre-existing medical conditions. Road transport emissions are the largest source of air pollution. Local Authorities are responsible for monitoring air quality in their area, and are required to designate Air Quality Management Areas (AQMAs) where air quality standards have been exceeded. There are eight active Air Quality Management Areas declared within the district (Air Quality Consultants, 2017). As road transport is currently the largest source of air pollution in UK urban areas, higher levels of directly emitted air pollutants occur beside and along the busiest roads. If strategically designed, GI can mitigate poor air quality on a local-scale.

The Office for National Statistics (2017b) reported that an estimated 1.4 billion kg of air pollutants were removed by woodlands, plants, grasslands and other

UK vegetation in 2015. This pollution removal saved the UK around £1 billion in avoided health damage costs. The Office for National Statistics (2018b) estimated the quantity of air pollutants removed and the associated avoided health costs for each district within the UK. They estimated that in the Derry and Strabane district, 2,029 kg of air pollutants were removed (UK average is 5,619 kg), with amount saved in healthcare costs per person in the district is £7.54 per person (UK average is £15.53). Therefore, there is scope to increase the capacity of vegetation to act as an ecosystem service for air pollution removal. By improving air quality, vegetation helps to mitigate these impacts on individuals' health and wellbeing as well as supporting habitat function and species survival. (Figure 3.11)



Figure 3.11 Green roof at Brooke Park

3.5 Biodiversity



Biodiversity Strategic Aim:

GI supports wildlife & habitats that provide ecosystem services

Cross Cutting Priorities	Potential Actions
<p>Communication & Engagement: Develop awareness, understanding and appreciation of the value of green infrastructure to create change at a policy, organisational and individual level</p>	Develop and deliver a GI education programme to target the public, schools, community and business sectors
<p>Health & Wellbeing: Define and develop the health and wellbeing benefits of Green Infrastructure for our environment and people</p>	Define the health and wellbeing benefits of ecosystem services
<p>Natural Capital: Define the natural capital and value of Green Infrastructure as an evidence base to justify future development</p>	Conduct a natural capital audit of the district
Key Strategic Priorities	Potential Actions
Minimise habitat loss & fragmentation, to include priority habitats & species	Create, enhance and restore priority habitats that would pose a regional, national or global loss of habitat
Minimise the impacts of invasive alien species	Raise awareness, understanding, management and biosecurity measures to address IAS
Adapt to the current & predicted effects of climate change, to minimise the impact on native habitats & species	Raise awareness, understanding and the impacts of climate change for key habitats, species and ecosystem services.
Address the impact of air & water pollution on biodiversity	Plant woodlands to reduce diffuse pollution and improve water quality to meet the Water Framework Directive

Figure 3.12 - Biodiversity strategic theme's, aims, priorities and potential actions. .



CLIMATE CHANGE



"The build-up of man-made gases in the atmosphere that trap the sun's heat, resulting in warming of the planet and causing changes in weather patterns around the world"

Climate Change Definition

3.6 Climate Change

Climate change is one of the most serious global threats. Human activities have increased the level of greenhouse gases, to 30% higher than at any time during the last 800,000 years (Intergovernmental Panel on Climate Change, 2014).

The global effects of climate change are already leading to loss of sea ice, accelerated sea level rise, increases in temperatures and rainfall, and more frequent, intense severe weather events. The effects have and will continue to result in flooding, heat risk, water shortages, coastal and landscape erosion, damage to habitats and risk to species, changing seasonal patterns and food supply insecurity.



Weather patterns

3.6.1 Projections

In Northern Ireland, the daily maximum and minimum temperature extremes have increased by over 1°C since the 1950s (Brown et al., 2008) and heavy seasonal and annual rainfall events have increased (Jones et al., 2013). The average UK relative sea level has increased by 1.4 ± 0.2 mm/year since 1901 (Woodworth et al., 2009). Climate projections for the UK are based on low, medium and high carbon emission scenarios. Based on the medium emissions scenario the predictions are:

- Daily summer temperature for Belfast and NI will reach 28.5 by 2041: &
- Winter rainfall levels over a 5-day period will increase to 76.9mm (an increase of over 6mm from the previous 30 years) (ASC, 2016).

Guerreiro et al. (2018) examined projected changes in river basin flooding in European cities and model projections found that Derry could experience an 80% increase in the current one in ten-year flood events. Derry is potentially more at risk from climate change than other parts of the UK (Figure 3.13).

3.6

Climate Change

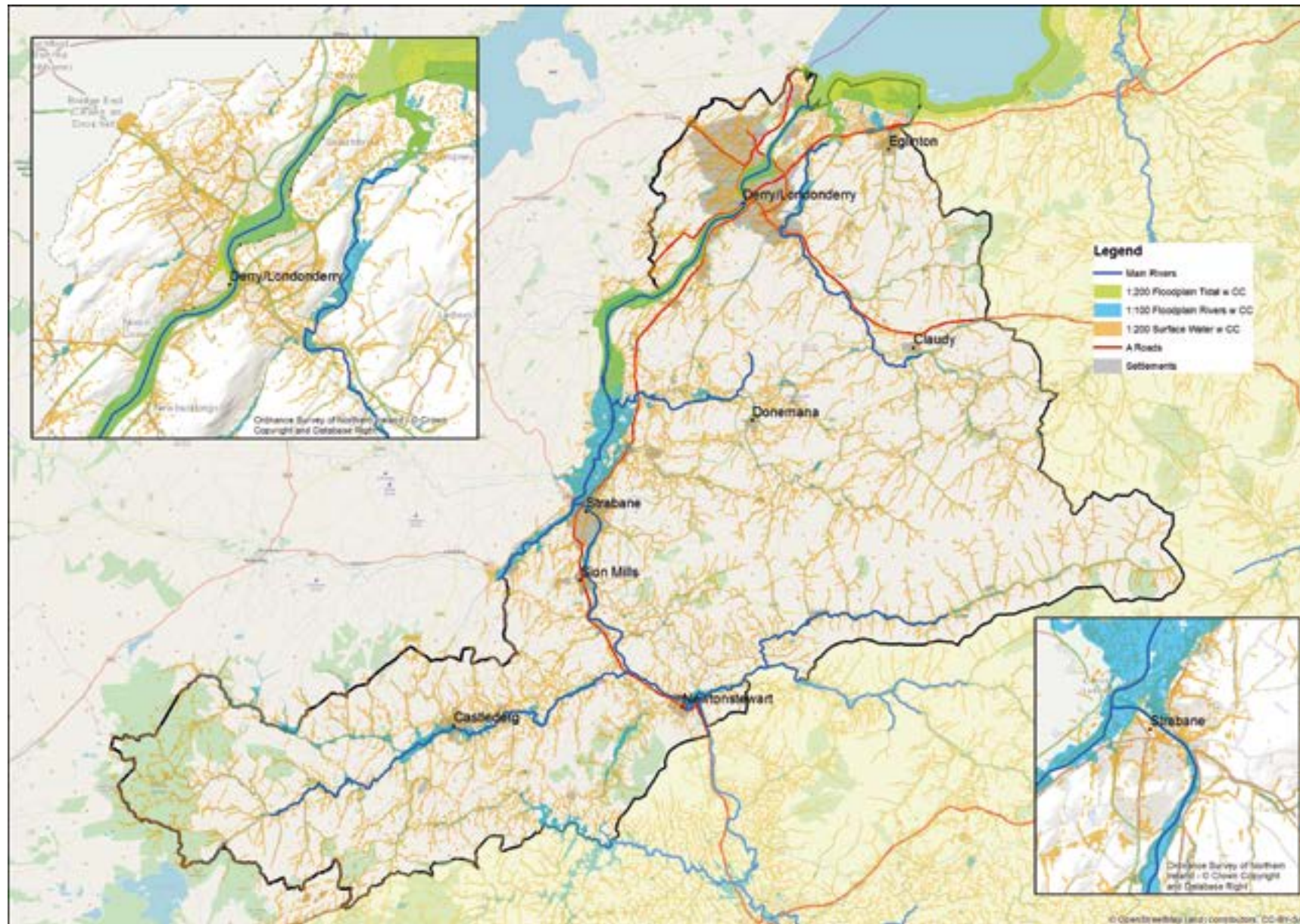
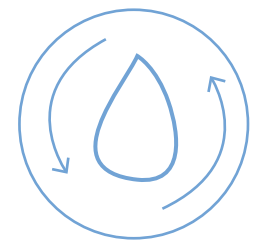


Figure 3.13 Flood risk map of the district to 2030

3.6.2 Impacts

High temperatures have a negative effect on human health and wellbeing, with an increase in mortality and hospital admissions for respiratory causes. In Northern Ireland, there are currently estimated 0.9 excess deaths per 100,000 population per year. Heat-related mortality in the 2050s is estimated to increase to between 1.5-6.1 / 100,000, which would equate to about 30 - 100 premature deaths per year (ASC, 2016).

In the North West, climate change leads to changes in the frequency, intensity, duration, and timing of extreme weather and climate events. Within the city and district, the effects are being increasingly felt with instances of severe flooding, heatwaves and disruption from wind and severe cold. The impacts of these include damage and disruption to business, community, infrastructure, agriculture and the natural environment, health, water supply, productivity and daily life. These issues must be addressed if residents' quality of life is to be maintained and enhanced.

Mitigation

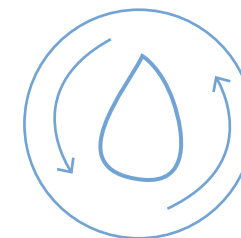
Measures to reduce emissions and mitigate against further global warming

Adaptation

Actions to adapt and create a resilient society to current and projected climate change and severe weather events.



3.6 Climate Change



3.6.3 Responses

Response to the challenge of climate change can be defined as mitigation and adaptation.

The UK Government is required under the Climate Change Act 2008, to publish a UK wide climate change risk assessment every five years (Figure 3.14).

The first Northern Ireland Climate Change Adaptation Programme was published in 2014 (Department of the Environment, 2014), which outlines actions to tackle the risks identified by the first UK Climate Change Risk Assessment (CCRA) in 2012 (HR Wallingford, 2012).

The second CCRA (ASC, 2016) will feed into the next Northern Ireland Climate Change Adaptation Programme expected in 2019.

It is widely accepted that nature based solutions through green infrastructure offers 'no regret' responses to climate change delivering multiple benefits to society and the environment (Figure 3.15). For example, trees & vegetation can contribute to improved air quality, reduce the risk of flooding, provide a sustainable source of fuel, habitats for wildlife, and act as source of carbon storage as well as providing recreation and amenity benefits.

University College London (Wilkes et al., 2018) found that urban trees could store as much carbon as tropical forests. They found that Camden's trees store on average 51.7 metric tons of carbon / ha. Although, certain areas store up to 178 metric tons of carbon / ha. Overall, UK forests store on average 53.6 metric tons of carbon / ha. These areas provide carbon storage roughly on par with tropical forests. Therefore, by increasing the area of woodland, we can increase the carbon storage within the district.

SUDS measures can mitigate flood risks, for example, green roofs and permeable paving, ponds or wetlands, which can reduce surface water run-off. Also, natural flood management with trees, riparian planting and soft landscaping can provide significant benefits in terms of water management and flood alleviation.

Local authorities are one of the first to deal with the immediate consequences of severe weather events. Therefore, they play a critical role in implementing prevention measures and encouraging collective action through GI. Under the District's Strategic Growth Plan (Derry City and Strabane District Council, 2017) Environment and Regeneration Pillar, the outcome, '*we connect people and opportunities through our infrastructure*', outlines a number of key actions that are linked to GI solutions to address climate change.

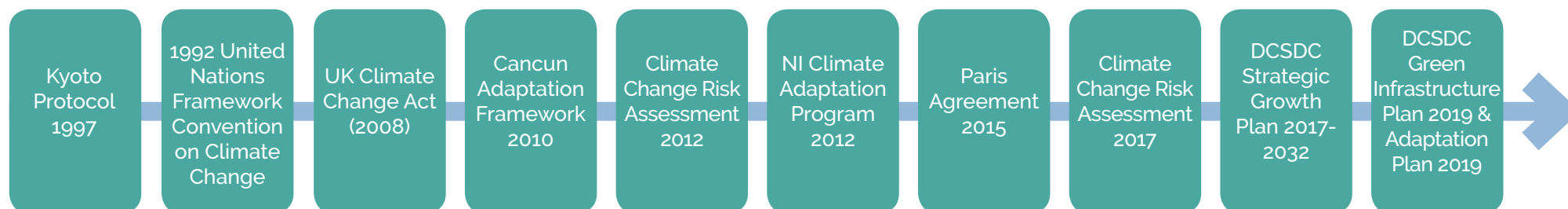
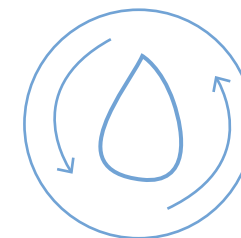


Figure 3.14 Climate change legislation and policy timeline

GREEN INFRASTRUCTURE	ADAPTATION BENEFITS	MITIGATION BENEFITS
Urban Tree Planting	<ul style="list-style-type: none"> • Cooling • Wind Protection • Flood alleviation • Air quality • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction • Sustainable Materials • Sustainable travel
Parks & Open Spaces	<ul style="list-style-type: none"> • Cooling • Wind Protection • Flood alleviation • Air quality • Habitat & Species • Public awareness 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction • Sustainable Materials • Sustainable travel
Permeable surfaces / SuDS	<ul style="list-style-type: none"> • Flood alleviation • Water Supply • Water quality 	<ul style="list-style-type: none"> • Energy reduction • Sustainable Materials
Woodland retention & development	<ul style="list-style-type: none"> • Flood alleviation • Soil erosion • Air quality • Water quality • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction
Riparian planting	<ul style="list-style-type: none"> • Flood alleviation • Soil erosion • Air quality • Water quality • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction
River 'naturalisation'	<ul style="list-style-type: none"> • Flood alleviation • Soil erosion • Water quality • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction

GREEN INFRASTRUCTURE	ADAPTATION BENEFITS	MITIGATION BENEFITS
Wetland restoration, riparian buffer zones	<ul style="list-style-type: none"> • Flood alleviation • Water quality • Coastal erosion • Habitat & Species 	<ul style="list-style-type: none"> • Energy reduction
Restoration of upland vegetation	<ul style="list-style-type: none"> • Flood alleviation • Soil erosion • Air quality • Water quality • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage
Food Production	<ul style="list-style-type: none"> • Flood alleviation • Soil erosion • Air quality • Water quality • Habitat & Species 	<ul style="list-style-type: none"> • Reduced emissions • Carbon storage
Green Corridors	<ul style="list-style-type: none"> • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage
Sustainable Travel	<ul style="list-style-type: none"> • Sustainable travel 	<ul style="list-style-type: none"> • Reduced emissions
Recreation provision	<ul style="list-style-type: none"> • Manage visitor pressure at stressed sites 	<ul style="list-style-type: none"> • Reduced emissions
'Greening' of buildings	<ul style="list-style-type: none"> • Cooling • Wind Protection • Flood alleviation • Air quality • Water quality • Water supply • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction
Private Gardens (reinstatement & enhancing biodiversity value)	<ul style="list-style-type: none"> • Flood alleviation • Air quality • Water quality • Water supply • Habitat & Species 	<ul style="list-style-type: none"> • Carbon storage • Energy reduction

Figure 3.15 GI adaptation and mitigation benefits



Climate Change Strategic Aim:

GI will be maximised to mitigate against and adapt to the effects of climate change

Cross Cutting Priorities	Potential Actions
Communication and Engagement: Develop awareness, understanding and appreciation of the value of green infrastructure to create change at a policy, organizational and individual level	Educational programmes/workshops/conferences /specialist courses for researchers, technical people & designers
Health & Wellbeing: Define and develop the health and wellbeing benefits of Green Infrastructure for our environment and people	Measures to address heat stress and flood risk
Natural Capital: Define the natural capital and value of Green Infrastructure as an evidence base to justify future development	Calculate the volume of carbon stored, level of flood risk reduction by GI solutions
Key Strategic Priorities	Potential Actions
Develop Climate Action Plan	Develop a climate adaptation and mitigation plan for the District
Develop green infrastructure as preferred climate action response	Encourage SUDS to reduce the need for additional grey infrastructure
Develop green infrastructure to address the effects of climate change and severe weather events in the city and district	Planting floodplain, riparian & wider catchment woodland for flood risk management

Figure 3.16 - Climate Change strategic theme's, aims, priorities and potential actions .





4.1 Delivery

Following the adoption of the GI plan, the next stage is the development of the GI Action Plan. The Action Plan will outline short, medium and long-term collective actions by partners and stakeholders, to deliver the key and cross cutting priorities. Working in partnership the Derry and Strabane GI Stakeholder Group (Appendix 1), we will utilise a GI approach that cuts across boundaries, building partnerships that identify mutual benefits and unlocking resources for environmental economic and social benefits. The partnership will promote GI as essential infrastructure and ensure decision-making is at a landscape scale with cross boundary projects.

GI should be considered at an early stage with planners and developers, so that the full benefits and functions can be realised. It should be integrated into site master planning. It needs to be at the heart of future planning and development within the district and should be seen as a critical part of the considerations embedded at the start of any development project.

Community engagement during the creation of green infrastructure is vital at all stages in the process, in order to ensure its success. The involvement of the local community brings social benefits, for example, community cohesion, provides residents with a sense of ownership and from this a higher level of satisfaction and positive perception of quality.

4.2 Funding

Funding will be sought from a range of sources to deliver projects and initiatives in the short, medium and long term. Funding opportunities include:

- National, for example, Heritage Lottery Fund and a range of smaller natural heritage funding organisations;
- European, for example, Northern Periphery and Artic Programme, INTEREGG,

- PEACE, Rural Development Programme and LIFE;
- Cross-departmental funding from partnerships with a shared interest and outcomes. For example, Department for Infrastructure Greenway Provision, Department for Agriculture Environment and Rural Affairs' River Basin Management Plans;
- Council's rates will assist with capital development projects; and
- Developer contributions and developments for greenway linkages and play provision.

4.3 Monitoring

The GI Plan will be a live document. It will be monitored and reviewed annually, to monitor progress towards achieving the actions that will be outlined in the GI Action Plan. Monitoring will focus on the extent to which the planned GI actions are delivered and how the associated multi-functional benefits are being delivered at a local level. Cases studies that demonstrate project delivery and showcase success will be profiled on the Council website and promoted to partners.

The Rural Needs Act (NI) 2016 places a duty on local authorities to have due regard for local needs when developing, adopting, implementing or revising policies, strategies and plans and designing and delivering public services. This plan is currently being screened to ensure that this strategy supports sustainable rural development in accordance with this statutory duty. Also, it is being screened for the adverse impact on section 75 groups.

In addition, the GI Plan has been screened in accordance with the Habitats Directive and associated national guidance. This process has established that there are no potential significant effects arising from the plan or in-combination with the implementation of other plans in the area. Therefore, a Stage 2 Appropriate Assessment is not necessary.

GLOSSARY

Blue infrastructure are examples of landscapes that are linked to water, for example, loughs, lakes, rivers and canals.

Blue ways are waterways, for example, rivers, loughs, canals, lakes and ponds.

Connectivity is the connection between different GI assets, to help maximise the benefits that they generate.

Ecosystem Services are the benefits people obtain from ecosystems, for example, soil formation, food, water, climate control and recreational experiences.

Greenways are traffic-free routes that are generally separated from traffic, for example, old railways, canal towpaths, riverbanks, forest roads and tongues of open space leading into urban areas.

Green Infrastructure is an interconnected network of multi-functional green and blue spaces, which provide multiple environmental, economic and social benefits, linked throughout the urban and rural landscape.

Green Infrastructure Approach involves land-use planning utilising GI, to promote the widest range of functions, which can be performed by the same asset, unlocking the greatest number of benefits.

Green Infrastructure Asset is the individual components of green infrastructure, for example, parks, woodlands, hedgerows, rivers and lakes.

Green Infrastructure Function is the roles that GI assets can play, for example, stores water or carbon.

Green Space are vegetated areas, for example, woodlands, parks, natural habitats, allotments and playing fields.

Grey Infrastructure is hard engineering assets, for example, transport, utilities and commercial infrastructure.

Multi-functionality is when a GI asset can perform several GI functions simultaneously on a site or across a GI network.

SUDS are sustainable urban drainage systems designed to reduce the potential impact of new and existing developments on surface water drainage.

Wildlife Corridor are areas of habitat that species can utilise to migrate to other wildlife areas.

- Air Quality Consultants. 2017. 2015 Updating and Screening Assessment, 2016 Progress Report and 2017 Progress Report: Derry City & Strabane District Council. <http://www.airqualityni.co.uk/assets/documents/dc-reports/2015-2016-and-2017-Derry-and-Strabane-USA-2015-and-PR-2016-and-2017.pdf> Accessed 16/11/2018.
- ASC. 2016. UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Northern Ireland. Adaptation Sub-Committee of the Committee on Climate Change, London.
- Bristol City Council. 2013. A Good Food Plan For Bristol. http://bristolfoodpolicycouncil.org/wp-content/uploads/2013/03/Bristol-Good-Food-Plan_lowres.pdf Accessed 07/11/2018.
- Brown, S. J., Caesar, J. and Ferro, C. A. T. 2008. 'Global changes in extreme daily temperature since 1950'. J. Geophys. Res., 113.
- Davies, C., MacFarlane, R., McGloin, C. and Roe, M. 2015. Green Infrastructure Planning Guide. http://www.greeninfrastructurenw.co.uk/resources/North_East_Green_Infrastructure_Planning_Guide.pdf Accessed 17/10/2018
- Department of Environment. 1994. Biodiversity: The UK Action Plan. http://jncc.defra.gov.uk/PDF/UKBAP_Action-Plan-1994.pdf Accessed 16/11/2018.
- Department of the Environment. 2015a. Strategic Planning Policy Statement for Northern Ireland: Planning for sustainable Development. https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf Accessed 27/03/2018
- Department of the Environment. 2015b. North Western River Basin Management Plan 2015-21. <https://www.daera-ni.gov.uk/publications/north-western-river-basin-management-plan-2015-2021> Accessed 18/10/2018
- Department of the Environment. 2014. Northern Ireland Climate Change Adaptation Programme. <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Northern%20Ireland%20Climate%20Change%20Adaptation%20Programme.pdf> Accessed 07/02/2018
- Department of Environment. 2013. An Invasive Alien Species Strategy for Northern Ireland. <https://www.daera-ni.gov.uk/sites/default/files/publications/doe/invasive-species-2013-4--web.pdf> Accessed 18/10/2018
- Department for Regional Development. 2016. Sustainable Water – A Long Term Water Strategy for Northern Ireland (2015 – 2040). <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/drd/sustainable-water-a-long-term-water-strategy-for-northern-ireland-2015-2040.PDF> Accessed 04/01/2019
- Department for Regional Development. 2010. Regional Development Strategy 2035: Building a Better Future. <https://www.planningni.gov.uk/index/policy/rds2035.pdf> Accessed 27/03/2018.
- Derry City and Strabane District Council. 2019. Derry City and Strabane District Council's Local Food and Drink Strategy and Action Plan 2018-2021. Unpublished Report.
- Derry City and Strabane District Council. 2018a. Derry City and Strabane District's Green Infrastructure Framework. <http://www.derrystrabane.com/getmedia/bbed1ff9-254b-4af7-a7f0-851e2110a8ae/GI-Framework.pdf> Accessed 01/10/2018
- Derry City and Strabane District Council. 2018b. Derry City and Strabane District: Tourism 2018-2015. <http://www.derrystrabane.com/tourism> Accessed 07/11/2018.
- Derry City and Strabane District Council. 2018c. Derry City and Strabane District Council's Local Food and Drink Strategy and Action Plan 2018-2021. Unpublished Report.
- Derry City and Strabane District Council. 2017. Derry City and Strabane District's Inclusive Growth Plan 2017-2032: Our Community Plan. http://www.derrystrabane.com/getmedia/1eb99e2e-e657-45a1-8b27-e2b35a36d65c/SGP_22-November2017_lowres.pdf Accessed 08/02/2018
- Derry City Council. 2012. Derry and Strabane's Local Biodiversity Action Plan 2008-2013. Unpublished Report.
- Economics for the Environment Consultancy and Centre for Regional Economic and Social Research. 2013. GI contribution to economic growth: a review. <http://sciencesearch.defra.gov.uk/Default.Module=MoreandLocation=NoneandCompleted=0andProjectID=19056> Accessed on 02/11/2018
- ECOTEC, 2008. The economic benefits of GI: Developing key tests for evaluating the benefits of GI. [https://www.forestry.gov.uk/pdf/nweeconomicbenefitsofgideveloping.pdf/\\$FILE/nweeconomicbenefitsofgideveloping.pdf](https://www.forestry.gov.uk/pdf/nweeconomicbenefitsofgideveloping.pdf/$FILE/nweeconomicbenefitsofgideveloping.pdf) Accessed 17/10/2018

REFERENCES

- Ferranti, E. J. S., MacKenzie, A. R., Ashworth, K., and Hewitt, C.N. 2018. First Steps in Air Quality for Built Environment Practitioners. Technical Report. University of Birmingham and TDAG. Unpublished report.
- Fields in Trust. 2018. Revaluing parks and green spaces. <http://www.fieldsintrust.org/Upload/file/research/Revaluing-Parks-and-Green-Spaces-Report.pdf> Accessed 18/10/2018.
- Fields in Trust. 2018. Revaluing parks and green spaces. <http://www.fieldsintrust.org/Upload/file/research/Revaluing-Parks-and-Green-Spaces-Report.pdf> Accessed 18/10/2018.
- Fischer, M., Rounsevell, M., Torre-Marín Rando, A., Mader, A., Church, A., Elbakidze, M., Elias, V., Hahn, T., Harrison, P. A., Hauck, J., Martín-Lopez, B. Ring, I., Sandstorm, C., Sousa Pinto, I., Visconti, P., Zimmermann, N.E. 2018. Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Europe and Central Asia of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. https://www.ipbes.net/system/tdf/ipbes_6_15_add.4_eca_english.pdf?file=1&type=node&id=28319 Accessed 07/11/2018.
- Forest Research. 2011. Health Benefits of Street Trees. <https://www.forestresearch.gov.uk/research/health-benefits-of-street-trees/> Accessed 17/10/2018.
- Forest Research, 2010. Benefits of Green Infrastructure. <https://www.forestresearch.gov.uk/tools-and-resources/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/what-is-greenspacegreen-infrastructure-gi/> Accessed 06/11/2018
- Future Analytics, ALTEMAR and DBA. 2018. Green and Blue Infrastructure Masterplan Roadmap for Tipperary Waterways. https://www.tipperarycoco.ie/sites/default/files/DRAFT_GB%20Infrastructure%20Masterplan%20Roadmap%20for%20Tipperary%20Waterways_v4_final.pdf Accessed 19/10/2018.
- Greater London Authority. 2015. Natural Capital: Investing in a GI for a Future London. <https://www.london.gov.uk/sites/default/files/gitaskforcereport.hyperlink.pdf> Accessed 17/10/2018
- Guerreiro, S. B., Dawson, R.J., Kilsby, C., Lewis, E and Ford, A. 2018. 'Future heat-waves, droughts and floods in 571 European cities'. Environmental Research Letters. 13 034009
- Hesketh, K. R., Lakshman and van Sluijs, E. M. F. 2017. 'Barriers and facilitators to young children's physical activity and sedentary behaviour: a systematic review and synthesis of qualitative literature'. Obesity Reviews. 18 (9): 987 – 1017. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5575514/pdf/OBR-18-987.pdf> Accessed 07/01/2019
- HR Wallingford. 2012. A climate change risk assessment for Northern Ireland. https://www.climatenorthernireland.org.uk/cmsfiles/resources/files/climate_change_risk_assessment_NI_2012_FULL-REPORT.pdf Accessed 07/02/2018
- Intergovernmental Panel on Climate Change. 2014. Climate Change 2014: Synthesis Report. <http://www.ipcc.ch/report/ar5/syr/> Accessed 16/11/2018.
- Jones, M. R., Fowler, H. J., Kilsby, C. G., and Blenkinsop, S. 2013. 'An assessment of changes in seasonal and annual extreme rainfall in the UK between 1961 and 2009', Int. J. Climatol., 33, 1178–1194.
- Landscape Institute. 2009. Green infrastructure: connected and multifunctional landscapes. https://www.landscapeinstitute.org/PDF/Contribute/GreenInfrastructurepositionstatement13May09_001.pdf Accessed 07/11/2018.
- Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborner, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., and Wynne, G.R. 2010. Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network. <https://webarchive.nationalarchives.gov.uk/20130402170324/http://archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf> Accessed 20/11/2018.
- National Audit Office. 2017. Air Quality. <https://www.nao.org.uk/wp-content/uploads/2017/11/Air-quality.pdf> Accessed 06/11/2018
- Natural England. 2011. Green space access, green space use, physical activity and overweight. <http://publications.naturalengland.org.uk/publication/40017> Accessed 17/10/2018
- Northern Ireland Executive. 2016. Draft Programme for Government Framework 2016-2021. <http://www.niassembly.gov.uk/assembly-business/committees/2016-2017/committee-for-the-executive-office/reports/draft-programme-for-government-2016-21/> Accessed 16/11/2018.
- Office for National Statistics. 2018a. UK natural capital: ecosystem accounts for urban areas. <https://www.ons.gov.uk/releases/urbanecosystemaccounts> Accessed 07/11/2018.
- Office for National Statistics. 2018b. UK air pollution removal: how much pollution does vegetation remove in your area? <https://www.ons.gov.uk/economy/environmentalaccounts/articles/removalhowmuchpollutiondoesvegetationremoveinyourarea/2018-07-30> Accessed 18/10/2018

REFERENCES

- Office for National Statistics. 2017a. Principles of Natural Capital Accounting. <https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/principlesofnaturalcapitalaccounting> Accessed 17/10/2018
- Office for National Statistics. 2017b. Natural Capital. <https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/methodologies/naturalcapital> Accessed 18/10/2018
- Outdoor Recreation Northern Ireland. 2015a. Review of water based tourism and leisure activities within L Foyle. Unpublished report.
- Outdoor Recreation Northern Ireland. 2015b. Feasibility study into the development of Derg Valley riverside walk/multi activity route. Unpublished report.
- Play England. 2018. Why Play is Important. <http://www.playengland.org.uk/about-us/why-play-is-important/> Accessed 07/01/2019.
- Public Health England. 2018. Promoting healthy weight in children, young people and families: a resource to support local authorities. <https://www.gov.uk/government/publications/promoting-healthy-weight-in-children-young-people-and-families> Accessed on 02/11/2018
- Sustrans. 2017. Bike Life. <https://www.sustrans.org.uk/bikelifebelfast> Accessed 15/11/2018.
- Trees for Cities. 2018. Valuing Ealing's Urban Trees. <https://www.treesforcities.org/downloads/files/Ealing-i-Tree-report.pdf> Accessed 18/10/2018
- UK Health Forum. 2014. Risk Factor Based Modelling for Public Health England. <http://www.ukhealthforum.org.uk/prevention/pie/?entryid43=38207> Accessed on 02/11/2018
- Vivid Economics. 2017. Natural Capital accounts for public green space in London. <http://www.vivideconomics.com/wp-content/uploads/2017/11/Natural-Capital-Account-for-London-Methodology-Appendix.pdf> Accessed 06/11/2018
- Vivid Economics. 2016. The contribution made by Sheffield's parks to the wellbeing of the city's citizens. <http://www.vivideconomics.com/wp-content/uploads/2016/11/Briefing-The-value-of-Sheffields-parks.pdf> Accessed 06/11/2018
- Waterways Ireland. 2016. Valuing Ireland's Rural and Urban Inland Waterways. https://www.waterwaysireland.org/Documents/Research/Value%20of%20Inland%20Waterways_2016.pdf Accessed 09/11/2018.
- Wilkes, P., Disney, M., Vicari, M. B., Calders, K. and Burt, A. 2018. 'Estimating urban above ground biomass with multi-scale LiDAR'. Carbon Balance and Management, 13.
- Woodworth, P. L., White, N. J., Jevrejeva, S., Holgate, S. J., Church, J. A., and Gehrels, W. R. 2009. 'Evidence for the acceleration of sea-level on multi-decade and century timescales'. International Journal of Climatology, 29 (6): 777-78

APPENDIX 1

APPENDIX 1

The GI Plan has been developed by Derry City and Strabane District Council, in partnership with the Derry and Strabane Green Infrastructure Stakeholder Group. We are grateful to all of the stakeholders involved with the consultation and development of the plan.

APEX Housing Association
Creggan Country Park
Department of Agriculture, Environment and Rural Affairs
Department for Communities
Department for Infrastructure
Education Authority
Habinteg Housing Association
Loughs Agency
Northern Ireland Housing Executive
Public Health Agency
Radius Housing
RAPID
Source to Tap
Sustrans
University of Ulster
Western Health and Social Care Trust
Woodland Trust

APPENDIX 2 International, National, Regional & Local Legislation and Policy

International:

Legislation

- Convention on Wetlands of International Importance (the Ramsar Convention) 1971, covers the designation of wetlands of international importance as Ramsar sites, the promotion of the wise use of wetlands by each country and international co-operation with other countries.
- Convention on Biological Diversity (1992) is dedicated to the conservation and sustainable use of biological diversity.
- United Nations Framework Convention on Climate Change (1994) aims to stabilise greenhouse gases
- The Kyoto Protocol (1997) is an international agreement linked to the United Nations Framework Convention on Climate Change, which sets internationally binding emission reduction targets.
- Paris Agreement (2016) aims to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2C above pre-industrial levels and to strengthen the ability of countries to deal with the impacts of climate change.
- Water Framework Directive (2000) aims to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater.
- Birds Directive (2009) outlines the conservation of wild birds (the Birds Directive) and the Habitats Directive (1992) documents the conservation of natural habitats and wild flora and fauna, makes provision for the protection of certain habitats and species, which enable the designation of Special Protection Areas and Special Areas of Conservation (endangered species and habitats of endangered species) respectively. Collectively, these designated sites contribute to an EU Community network known as NATURA 2000 sites.
- UN Convention on the Rights of the Child 1990 (Article 31) outlines the right of the child to leisure, to engage in play and recreational activities.
- Regulation 1143/2014 on the prevention and management of the introduction and spread of IAS)

Policies

- Green Infrastructure – Enhancing Europe's Natural Capital (2013) outlines the development of a GI strategy.
- Building a Green Infrastructure for Europe (2013) outlines GI, its relationship with Natura 2000 sites and case studies.
- Our Life Insurance, Our Natural Capital: An EU Biodiversity Strategy to 2020 (2011) aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020.
- EU strategy on adaptation to climate change (2013) aims to make Europe more climate-resilient.

National:

Legislation

Climate Change Act (2008) aims to reduce UK greenhouse gas emissions by 2050 and to make provision for adaptation to climate change.

Policies

The UK National Air Quality Strategy (2011) outlines the standards and objectives for the eight main health-threatening air pollutants in the UK.

UK Climate Change Risk Assessment 2017: National Summary (NI), is a requirement by the Climate Change Act 2008, to produce a UK Climate Change Risk Assessment every five years. This summarises the Northern Ireland specific evidence in the UK wide assessment.

APPENDIX 2 International, National, Regional & Local Legislation and Policy

Regional:

Legislation

- The Wildlife and Natural Environment (NI) Act 2011 introduced a statutory duty for all public bodies to further the conservation of biodiversity.
- Children's Services Co-operation Act (NI) 2015 – statutory duty of co-operation between public bodies in areas relating to the well-being of children.
- The Air Quality Standards (Amendment) Regulations (Northern Ireland) 2017, outlines revised air quality regulations for Northern Ireland.
- The Local Government Act (NI) 2014 introduced the creation of a Community Plan by local authorities to improve the long-term social, economic and environmental well-being of the district. This Green Infrastructure Framework links with Council's Community Plan mission, 'to improve the social, economic and environmental well-being of the city and district and to do so in a sustainable way' (Derry City and Strabane District Council, 2017).
- Local Government Order (1972) and Recreational Youth Service (NI) Order 1986, outlines the statutory responsibility for the provision for recreational, social, physical and cultural activities.
- Marine Act (NI) 2013 outlines the need to prepare plans for the improved management of the regions' marine area.
- The Water and Sewerage Services Act (NI) 2016, introduces new restrictions to the right to connect surface water sewers to the public sewer network. It outlines that suitable alternatives include sustainable drainage systems.
- Planning Policy Statement 8: Open Space, Sport and Recreation (2004), sets out planning policies for the protection of open space, in association with residential development and the use of land for sport and outdoor recreation.
- Exercise - Explore – Enjoy: A Strategic Plan for Greenways (2016) outlines plans for a network of greenways, connecting towns and cities to the villages and countryside throughout Northern Ireland.
- Sustainable Water – A Long Term Water Strategy for Northern Ireland (2015 – 2040), aims to provide sustainable drinking water, sustainably manage flood risk and wastewater facilities.
- Northern Ireland Climate Change Adaptation Programme (2014) aims to address the main risks and opportunities identified in the associated risk assessment for the period 2014-2019.
- Making Life Better: A Whole System Strategic Framework for Public Health 2013 – 2023, aims to provide direction for policies and actions to improve the health and well-being of people in Northern Ireland and to reduce health inequalities.
- Valuing Nature: A Biodiversity Strategy for Northern Ireland to 2020 (2015), aims to progress towards halting biodiversity loss, establish an ecosystem approach for people to understand the benefits of nature.
- Draft Marine Plan for Northern Ireland 2018, aims promote a healthy marine area, which is sustainably managed for the economic, social and environmental prosperity for current and future generations.
- North Western River Basin Management Plan 2015 is an update to the North Western River Basin Management plan published in 2009 and outlines the objectives to deliver improvements in water quality by 2027.
- Invasive Alien Species Strategy for Northern Ireland 2013 aims to tackle the threats posed by invasive alien species.

Policies

- Children and Young People Strategy 2017-2027, outlines parameters for children's well-being to include enjoyment of play and leisure.
- Planning Policy Statement 2: Natural Heritage (2013) sets out planning policies for the conservation, protection and enhancement of our natural heritage. Also, it states, 'development plans should seek to identify and promote green and blue infrastructure.'

APPENDIX 2 International, National, Regional & Local Legislation and Policy

Local:

Policies

- North West Greenway Plan (2015) provides a plan for the development of a network of Greenways throughout the North West of Ireland.
- Derry City and Strabane District's Inclusive Strategic Growth Plan 2017 -2032: Our Community Plan aims to improve social, economic and environmental well-being and long-term objectives for the district to contribute to the sustainable development in Northern Ireland.
- Derry City and Strabane District's Local Development Plan 2032, will guide land-use development and set out policies and proposals for the use, development and protection of our settlements and countryside throughout the District. Once the plan is adopted, its Planning policies, zonings and development proposals will be used to determine planning applications throughout the District.
- Derry City and Strabane District Tourism 2018-2025: A New Level of Ambition. This tourism strategy has three core themes: history and heritage; creativity and culture; and activity and adventure.
- Derry City and Strabane District Local Food and Drink Strategy and Action Plan 2018-2021, aims to establish the district as a food destination.

Site	Ramsar Site: internationally important wetland site	Special Protection Area (SPA): internationally important for migratory birds	Special Area of Conservation (SAC): internationally important for habitats and species	Area of Special Scientific Interest (ASSI): Sites of high conservation value	National Nature Reserves (NNR): Sites of national importance	Area of Outstanding Natural Beauty (AONB): Landscape designation	Local Nature Reserve (LNR): Locally important for biodiversity
Lough Foyle	✓	✓		✓			
Fairy Water Bogs	✓		✓	✓			
River Faughan			✓	✓			
River Foyle			✓	✓			
Moneygal Bog & Moneygal Bart Part II			✓	✓			
Owenkillew River			✓	✓			
Aghabrack				✓			
Baronscourt				✓			
Bonds Glen				✓			
Butterlope Glen				✓			
Corbylin Wood				✓			
Croagh Bog				✓			
Drummahon				✓			
Ervey Wood				✓	✓		
Essan Burn & Mullyfamore				✓			
Grange Wood				✓			
Killeter Forest Bogs & Lakes				✓			
Lisnaragh				✓			
Lough Corr				✓			
Lower Creevagh				✓			
McKean's Moss & McKean's Moss Part II				✓			
Ness Wood				✓	✓		
Owenkillew & Glenelly Woods				✓			
Silverbrook Wood				✓			
Strabane Glen				✓			
Killeter Forest					✓		
Sperrin Mountains						✓	
Bay Road Park							✓
Killaloo Wood							✓
Oaks Wood							✓
Prehen Wood							✓

APPENDIX 3 SWOT Analysis

AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	
+ GENERIC +	<p>Current Green Infrastructure Provision</p> <ul style="list-style-type: none"> 6.8% of total land cover is accessible green space (8,500 hectares of which 6% is owned by DCSDC and 89% Forest Service) 511 hectares of water courses 90km of traffic free cycle routes 	<ul style="list-style-type: none"> Current GI benefits from existing GI Land management practices Sustainable travel networks 	<ul style="list-style-type: none"> Fragmentation Public / Private ownership Maintenance – e.g. greenways, parks, play parks in need of upgrade Awareness & appreciation of provision Orientation & Signage (Promotion, public access, orientation and interpretation) Lacks strategic direction 	<ul style="list-style-type: none"> Holistic management approach Strategic development approach through the Green Infrastructure Plan Tourism and recreation potential Health & Wellbeing opportunities Improved communication and awareness Strategic Growth Plan mechanism for delivering key actions To incorporate GI within the Local Development Plan policies Potential to incorporate GI into aspects of the proposed City Deal 	<ul style="list-style-type: none"> Climate change Resources – capacity and funding Planning processes Socio cultural landscape e.g. land ownership Partnership / management practices Land disposal / rezoned
	<p>Partnership / collaboration (Ways of Working) Green Infrastructure Stakeholder / Working Group in place</p>	<ul style="list-style-type: none"> Good relationships Support and commitment to GI Strategic Growth Plan model of engagement and co-design approach across the City and District Partnership and collaboration culture developed through the community planning process 	<ul style="list-style-type: none"> Resource and financial capacity Relationship issues Differing commitment levels across all stakeholders Silo working 	<ul style="list-style-type: none"> Improved communications Stakeholder network to be further developed Co-design approach to GI Plan Align to NI Program for Government indicators & outcomes GI provides mutual benefits Provide opportunity for knowledge exchange 	<ul style="list-style-type: none"> Resources – capacity and funding Changing personnel within stakeholder groups Change in focus for government departments Competing priorities (Internal & external)
	<p>Policy / legislative landscape What is the current national / local policy framework and how does it support/hinder gi</p> <p>(is there strong strategic direction for gi)</p>	<ul style="list-style-type: none"> Opportunity to integrate GI into LDP & Strategic Growth Plan 	<ul style="list-style-type: none"> Policy gaps – Lack of statutory obligation for local authority Climate Adaptation & GI 	<ul style="list-style-type: none"> Define value of GI (Natural Capital Study) Communication on the value of GI Relate to existing policies and plans Short term strategy to integrate GI within DCSDC to become 'business as usual' Medium – long term – integrate within all stakeholder's policies and plans 	<ul style="list-style-type: none"> Future Programme for Government Plans

Table 1.3: Strengths, weaknesses, opportunities & threats within the district

APPENDIX 3 SWOT Analysis

AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
+ BIODIVERSITY +	Ecosystem Services <ul style="list-style-type: none"> • Supports important regional biodiversity, and provides ecosystem services • Provides recreational opportunities • The Sperrins are one of the largest upland areas in Ireland containing upland heath, oakwood and mixed native woodland, raised bog and blanket bog • Picturesque regional assets (contributing to attractiveness for local communities and tourism) • Carbon storage, water storage & purification • 10,151 hectares of peat bogs (8.1% of land cover) • 11,956 hectares of moors and heathland (9.6% of land cover) 	<ul style="list-style-type: none"> • Lack of access to the countryside, providing limited opportunities for tourists • AONB designation provides limited countryside protection • Lack of connectivity between woodlands • Upland peatland damage impacting water quality & quantity in lower lying areas • Ecosystem services are currently not comprehensively valued 	<ul style="list-style-type: none"> • Improve countryside access to increase activity tourism offer and recreational opportunities for residents • Boost local economies through increased visitors and dwell time • Opportunity to consult on DAERA review of access related legislation • Implement an AONB Management Plan • Restoration of peatlands to provide carbon sinks and flood alleviation • Offers opportunities to partner with local landowners 	<ul style="list-style-type: none"> • Insensitive development in the Countryside compromising Landscape Character • Changing land management eg: over/under grazing and peat extraction • Changing climate drying out peat • Releasing carbon and impacting water quality
	<ul style="list-style-type: none"> • Mature urban trees help to mitigate the impact of climate change, reduce air pollution and noise levels, reduce stress & improve well-being • Large areas of good quality broadleaved woodland in the region • Tree lined river corridors providing good ecosystem services and mitigating flooding effects • Major areas of upland forestry providing employment in the rural economy and opportunities for recreation • 252 hectares of broadleaved forest (0.2% of land cover) • 5,844 hectares of coniferous forest (4.7% of land cover) 	<ul style="list-style-type: none"> • New housing developments can lack tree planting & development places pressures on areas of existing trees • Lack of integrated tree and woodland management across the district • Lack of connectivity between woodlands and forestry areas 	<ul style="list-style-type: none"> • Increase tree planting in both urban and rural areas • Continue to work in partnership with the Forest Service and the Woodland Trust • Make use of the substantial Forest Service Estate for recreation • Build on existing TPO provision to ensure protection of existing trees and woodland • Council Tree Officer to protect, enhance and manage the region's trees • Increase riparian tree planting to alleviate flood risk • Increase urban tree cover to alleviate urban heat island effect 	<ul style="list-style-type: none"> • Development pressure on existing trees • Increased Climate Change driven tree stress and tree disease / pests • Age of existing mature urban trees

Table 1.3: Strengths, weaknesses, opportunities & threats within the district

APPENDIX 3 SWOT Analysis

AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
+ PEOPLE & PLACE +	Green Spaces & Play Provision	<ul style="list-style-type: none"> Variation in the distribution, quality and connection between green spaces Lack of public park within the Strabane area Access to play and recreation in villages and smaller settlements can be limited Need to develop management plans for key open spaces 	<ul style="list-style-type: none"> Increase the number and quality of green spaces and promote the greening of the urban environment Identify improved and new play provision across the district and to consider active travel and accessibility Identify and zone potential greenspace & incorporate GI into open space strategy in Local Development Plan 	<ul style="list-style-type: none"> Development pressure on public open spaces reducing connectivity for people and wildlife Funding constraints leading to a lack of investment Antisocial behaviour
	Active & sustainable Travel	<ul style="list-style-type: none"> Some greenway infrastructure needs to be upgraded Some areas perceived as dangerous at certain times of day limiting use Gaps in connectivity 	<ul style="list-style-type: none"> Complete gaps in sustainable access within the district, to include access to green & blue spaces Expand network within the district and cross boarder ie: The North West Greenways Project, opportunities along old A5 and A6 roads Improve connectivity between residential developments to open spaces improving connectivity for people & wildlife Connect existing greenways with key sites providing active travel opportunities ie: Magee University Campus Integrate greenways into new public and private developments increasing their value as places to invest / live and work 	<ul style="list-style-type: none"> Development pressures on existing green corridors / greenways Development pressure on land proposed as a greenway Land ownership agreements Funding Constraints Flood risks as many greenways / green corridors are adjacent to rivers
	Blue Spaces	<ul style="list-style-type: none"> Lack of awareness of water based activities Water quality affecting levels of biodiversity Lack of riparian woodland along rivers can intensify damage caused by flooding 	<ul style="list-style-type: none"> Improved access to boost tourism, improving local economies; benefiting towns and villages along the route Improve the blue space tourism offer Improve water quality under the EU Water Framework Directive Define natural capital and value of blue spaces within the City & District 	<ul style="list-style-type: none"> Water quality due to pollution and run off from agricultural and forestry practices Invasive species such as giant hogweed and zebra mussels Increase and changing invasive species due to climate change Flooding Land ownership issues reducing access to water opportunities

APPENDIX 3 SWOT Analysis

AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">+ CLIMATE CHANGE +</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Natural Adaptation Approach</p>	<ul style="list-style-type: none"> Existing natural resources offer potential to reduce the risk of flooding & address increased temperatures Commitment of DCSDC to development and delivery of Climate Action Plan to mitigate and adapt to climate change 	<ul style="list-style-type: none"> Lack of legislation to support local authority climate action Lack of planning legislation to enforce climate action Lack of awareness of the issues of climate change and opportunities for action 	<ul style="list-style-type: none"> GI could be designed/managed to enhance ecosystem services, for example, reducing flood risk & improving air & water quality, protecting species Sustainable Urban Drainage (SUD's) is a cost effective way to handle rainwater - reducing run off into storm water systems, reducing flooding incidents and improving water quality Engage with developers to communicate the benefits of SUD's in place building Adapt existing built infrastructure to manage rainwater for example harvesting, infiltration and attenuation Develop upland areas for climate action Raise awareness of climate issues and solutions Develop GI to enable species and habitat resilience e.g. reduce fragmentation Integrate adaptation and mitigation measures into conservation management, planning and practice. 	<ul style="list-style-type: none"> Lack of awareness & buy in from developers Lack of economic value placed on natural flood management Lack of knowledge around natural flood management solutions and prevalence of hard engineering drainage solutions

Table 1.3: Strengths, weaknesses, opportunities & threats within the district

APPENDIX 3 SWOT Analysis

AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
+ ECONOMIC +	<ul style="list-style-type: none"> • Current provision of training and jobs • GI provides essential natural heritage features as key destinations for visitors and tourists • Support for food growing 	<ul style="list-style-type: none"> • Poor awareness & understanding of the value of GI and the economic benefits it can provide • Lack of awareness, gaps in provision and underdevelopment of the existing visitor product offer • Growth in green and slow adventure tourism • Development of the key proposition of activity and adventure under Council's tourism strategy • Development of the Food and Drink experience • Investment in marketing 	<ul style="list-style-type: none"> • Offer opportunities to boost the local economy by offering valuable by products like biomass or local food production • Engage with the new business development community to develop innovative value propositions that emphasize the potential of GI solutions to boost the economy • Promote the economic value of parks to provide jobs and training opportunities • Growth in green and slow adventure tourism • Development of the key proposition of activity and adventure under Council's tourism strategy • Development of the Food and Drink experience • Investment in marketing 	<ul style="list-style-type: none"> • Lack of buy-in from developers • Land ownership issues preventing access • Development or activities impacting negatively on aesthetics

Table 1.3: Strengths, weaknesses, opportunities & threats within the district

APPENDIX 3 PESTEL Analysis

	FACTOR	POSSIBLE CONSEQUENCES	PROPOSED MITIGATION
POLITICAL	<ul style="list-style-type: none"> BREXIT NI Executive and Assembly not in place, direct rule, lack of legislative representation from locally elected MLAs & Ministers Local elected representative support Legislative & policy context to support green infrastructure 	<ul style="list-style-type: none"> BREXIT and Direct Rule from Westminster may affect economic growth positively / negatively, depending on the economic and political climate. Also, it may impact the ability to access funding to deliver Green Infrastructure projects Lack of legislative support for GI actions e.g. planning regulations, climate action 	<ul style="list-style-type: none"> Develop a communication plan to engage with NI executive ministers, government departments, MLAs and local elected representatives to communicate & form partnerships to deliver GI plan Lobby and consult on all policy / legislative decisions relating to Green Infrastructure
ECONOMIC	<ul style="list-style-type: none"> Access to funding (resulting from BREXIT, available government department and Council funding) In August 2017, 4,888 people in the Council area were registered on the Job Seekers Claimant Count. There are pockets of deprivation and three quarters of our residents live in areas that have higher Claimant Count rates than the NI average (2.6%, August 2017). At 37.7% Derry City and Strabane District has a higher percentage of economically inactive people (those who are looking after a home/family; students; or retired) aged between 16 - 64 years old than the NI average (26.0%). The DCSDC area has one of the highest proportions of social housing within its area and has the second highest number of applicants on the social rented sector waiting list (4,360 at 31st March 2017). The amount of applicants in housing stress (at 30+ points) was 3,126 at 31st March 2017. 	<ul style="list-style-type: none"> Potentially unable to fully deliver the GI plan actions due to lack of available funds Need to define the natural capital of green infrastructure to address issues of economic deprivation, skills & job development, improved environments, housing and development 	<ul style="list-style-type: none"> Develop a funding plan Define the economic value (natural capital) of GI, to support the delivery of key objectives of Strategic Growth Plan 2017 -2032 (DCSDC, 2017). Ensure GI actions are included in key strategic initiatives such as the City Deal Develop tourism potential of GI for the City & District as an economic driver
SOCIOLOGICAL / CULTURAL	<ul style="list-style-type: none"> Attitudinal landscape; lack of general awareness, understanding and appreciation of green infrastructure Land ownership issues. Current legislation and societal views of land ownership and protection in NI. Barriers to use of space / contested space issues relative to NI Fitness / exercise demand: trend in leisure time and access to open space Population The estimated population of the district is 150,500. NISRA's 2012 projections show a population of 150,495 by 2025 (Below average for NI) Over the next 20 years the City and District will experience a significant shift in the age profile of the population, with a projected 4,000 fewer children aged under 16 with an increase in those of retirement age of around 14,000. Census, in 2011, recorded 33% of these as being economically inactive as result of disability or long term illness. 	<ul style="list-style-type: none"> Lack of community support for conservation and development of green infrastructure – community ownership and support vital to development and sustainability of GI GI Plan needs to consider the demographics of the City & District when planning for recreation to meet current and future needs of the population GI Plan needs to consider the socio cultural profile of existing and potential audiences / participants with GI 	<ul style="list-style-type: none"> Seek to understand participant and non-participant perspectives of GI (Audience insight and analysis) Engage with community groups, community safety wardens and improve connectivity to reduce barriers Consult with residents to understand and determine current and potential demand for outdoor recreation and GI services There is a need to increase awareness, understanding and action of environmental issues in order to facilitate collective responsibility and action Develop a communication plan and engage with internal staff, politicians, government departments, land owners and the public to raise awareness and understanding of GI

Table 1.4: Political, Economic, Social/Cultural, Technological, Environmental and Legal considerations

APPENDIX 3 PESTEL Analysis

	FACTOR	POSSIBLE CONSEQUENCES	PROPOSED MITIGATION
TECHNOLOGICAL	<ul style="list-style-type: none"> • SMART Cities projects, using technology for efficient decision making and services. • GIS mapping development • Border Control (specifically in relation to GI may be impacted by a hard border) • Increasing use of technology and sedentary lifestyles leading to disconnect from the environment 	<ul style="list-style-type: none"> • Opportunity to enhance GI development • Restrictions on cross border travel on GI assets • Lack of awareness, appreciation and collective responsibility, leading to lack of uptake of GI, to support services and take action to protect our environment. 	<ul style="list-style-type: none"> • Utilise sustainable renewable technology, data capture, mapping and modelling to enhance access to and utilisation of GI • Use of digital platforms to create awareness of GI
ENVIRONMENTAL	<ul style="list-style-type: none"> • Climate change • Invasive alien species • Landscape Character Assessment • Changes in agricultural practices • Our CO2 emissions per head of population are currently on a par with NI as a whole, 7.1 tonnes per capita • 34.9% recycling rate 	<ul style="list-style-type: none"> • Increased risk of flooding, pests, diseases, impacts on habitats, infrastructure and environmental health • Risk to the natural environment, loss of habitats, species and the economy • Changes in subsidies may result in changes in land management practices to include over / under management that could result in loss of habitats and species and effect landscape character. 	<ul style="list-style-type: none"> • Conduct a climate impact profile, deliver and implement a climate adaptation plan. • Work in partnership with DAERA to raise awareness, understanding and action of invasive alien species • Review Landscape character within the district and incorporate GI • Provide consultation responses in relation to proposed changes in agricultural policy and influence where possible
LEGAL / LEGISLATIVE	<ul style="list-style-type: none"> • BREXIT & Direct Rule • LDP & SPPS 	<ul style="list-style-type: none"> • Impact on respective environmental regulation • Potential delay in transposing EU and / UK legislation into NI law, for example, Climate Change Act 2008 • Driven by economic goals 	<ul style="list-style-type: none"> • Review of planning policy statements and LDP 2032 will provide opportunities to incorporate GI into LDP

Table 1.4: Political, Economic, Social/Cultural, Technological, Environmental and Legal considerations



Derry City & Strabane
District Council
Comhairle
Chathair Dhoire &
Cheantar an tSratha Báin
Derry Cittie & Strabane
Destríck Cooncil

Derry City and Strabane District Council

Green Infrastructure Plan 2019 - 2032

DEVELOPED BY
THE DERRY & STRABANE GREEN INFRASTRUCTURE STAKEHOLDER GROUP

This information is available upon request in a number of formats including large print, Braille, PDF, audio formats (CD, MP3, DAISY) and minority languages.

Telephone: 02871253253
Text phone: 02871376747
Or email: equality@derrystrabane.com