



The Royal Institute of the Architects of Ireland
The Registration Body for Architects in Ireland

The Administrative Officer

The Draft Kildare County Development Plan
Forward Planning
Áras Chill Dara
Devoy Park
Naas
Co. Kildare

24 May 2022

Subject: RIAI Response to *Public Consultation on Kildare County Council DRAFT Development Plan 2023 – 2029*

Dear Madam/Sir,

The Royal Institute of the Architects of Ireland (RIAI) is the competent authority and registration body for architects in the State.

We welcome the consultation process with Kildare County Council DRAFT Development Plan 2023 – 2029 and therefore invite you to consider this submission, which includes input from RIAI committees and taskforces.

Should you have any queries in relation to the above or should you require any further information, please do not hesitate to contact the undersigned (e: pramanundh@riai.ie).

Yours sincerely,

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RIAI Response to:

Public Consultation on Kildare County Council DRAFT Development Plan 2023 – 2029

1.0 INTRODUCTION

1.1 The Royal Institute of the Architects of Ireland (RIAI) welcomes the consultation process with Kildare County Council DRAFT Development Plan 2023 – 2029.

This submission is set out under two sections and includes input from RIAI committees and taskforces:

RIAI Housing Taskforce, which is comprised of architects working in housing in both the public and private sectors. Between the committee members and the organisations they represent, they act as Architects, Design Team Lead, Employers Representative, Assigned Certifier and Design Certifier for at least 50% of the housing delivery in Ireland. The committee is therefore well positioned to comment on housing issues both in Dublin and nationally.

The RIAI Sustainability Task Force is a committee comprised of architects working in the public and private sectors and in education who are experienced, skilled and knowledgeable sustainable design practitioners. The committee's remit is to promote and further the Architects professional obligation to take a leading role in tackling climate change in the built environment and on large-scale master planning projects. The committee works to promote the objectives of the RIAI Policy on Sustainability (2019) and the commitments made by the RIAI to place the UN Sustainable Development goals at the core of architectural practice.

RIAI Urban Design Taskforce membership consists of architects with an expertise in urban design, including practitioners from private practice, education, and the public sector. Promoting urban design as part of the architect's core spatial skills and advance the competencies in the subject, advancing the value of architects in the urban design process. promoting the continuing inclusion of the key principles of urban design in national policy, forward planning, and development management, creating public awareness of the benefits that urban design brings to the quality of everyday life, and the publication of exemplary practice and evidence-based research in the field of urban design.

RIAI Universal Design Taskforce is comprised of architects working in both the public and private sectors. Between the committee members and the organisations they represent, they act as Architects, Design Team Lead, Employers Representative, Assigned Certifier and Design Certifier.

SECTION A

2.0 ISSUES OF PRINCIPLE

2.1 A Vision Statement

We recommend that the *Development Plan Guidelines for Planning Authorities* should incorporate its own vision statement, which will in turn inform and reinforce the importance of each Local Authority developing their own vision statement, providing an anchor point for each individual Development Plan. The updating of Development Plans frequently results in the addition of more technical requirements, which in turn adds greater complexity and detail, which often results in reduced community engagement and participation. The vision statement should position the Development Plan Guidelines as a framework for planning inclusive, safe, healthy and happy places, safeguarding authentic cherished places and providing a platform for innovation and community for future generations, which will in turn filter down through the development of individual Development Plans for Planning Authorities.

2.2 An Executive Summary

The executive summary of the *Development Plan Guidelines for Planning Authorities*, should identify the overriding principles of the guidelines, which should inform and be translated across each individual Development Plan. The RIAI recommend that the following should form the basis for an executive summary:

- A) Effective Consultation and Participation Processes
- B) Greater focus on the Existing Built Fabric
- C) Sustainability and Climate Change
- D) The Importance of quality architecture and design-led approach
- E) Designing communities for Health and Well-being

2.3 Presentation of the Development Plan

The guideline document (currently in draft format – Development Plan Guidelines for Planning Authorities) notes under Section 2.7 Plan Design and Presentation (pg 31) notes that:

“There has been a tendency in the preparation of some development plans to include a policy or objective for numerous possible development scenarios, leading to extremely lengthy written statement documents. Documents of this scale can be very difficult to use for the public and can lack a strategic focus, often getting lost in a level of detail more suited to local area plans or restating, at length, material from other guidance or policy documents. Planning authorities should be aware of this tendency and strive to keep their development plan strategically focused and concise in nature.”

The RIAI suggest that the inclusion of a Vision Statement and Executive Summary in all Development Plans may help the Planning Authority to align interpretation and intent in a clear, unambiguous manner.

2.4 Holistic Approach: Community at the heart of stakeholder engagement

The RIAI recommend that a clear strategy is required in order for Planning Authorities to adopt a holistic approach to the advancement of individual Development Plans.

The RIAI believe that the development plan is effectively a contract between planners and the people. The role of the basic democracy in the making of the plan, through the input of elected representatives and public comment, needs to be emphasized, as there is the risk

that an overly rigid set of guidelines may work against local place making and community need.

While the guidelines are, positively, encouraging a move towards evidence-based and realistic, implementable, measured objectives – the concern is that there is little real awareness of the importance of a vision, and the role of quality design in the development of ‘sustainable communities.’ Difficult and all though it may be, this vision should be coming from the citizens as much as the ‘experts’ writing the development plan.

The Development Plan as a mechanism for public participation and ‘policing’ the planning process has been somewhat undermined by the experience of Strategic Housing Developments [SHDs]. Public confidence in the Development Plan process must be regained in order to get re-engagement and participation.

Stakeholders are predominantly still seen as utility providers and those with an “established” interest rather than trying to seek a diversity of views. Trying to place people at the heart of plan making would ultimately deliver stronger communities – further public engagement (whilst briefly mentioned) is required to seek to expand the authorship of our towns and cities.

2.5

Identifying the role of the Architect in the Development Plan Process

Section 2.2 of the Draft Development Plan Guidelines for Planning Authorities outlines the core Development Plan Team, and feeding from that, the staff resources which should provide input into the core team. However, the RIAI have concerns where there is no specific mention of the inclusion of an Architect within this team, or as part of a wider input.

Whilst some of the cross competencies as identified who are to feed into the core team may include architects, the RIAI believe the role of the Architect should be identified as part of the core team requirements for the Development Plan preparation process. The Architect is the traditional leader of the design team, and our inclusion in this core team would reflect in the recognition of the importance of quality design, ultimately resulting in a considered collaborative approach, and contributing the quality and effectiveness of the Development Plan as a result.

Architects bring specific skill sets to the plan-making process that complement the role of the Planner. These include:

- in-depth expertise on urbanism, conservation and heritage, sustainability,
- universal design, housing and communities, all from the large-scale structure of our cities, towns, villages and natural landscapes, through to the granular detail.
- knowledge of regulations, standards and directives including their implementation and effectiveness
- management and coordination of complex issues and multi-disciplinary teams, to achieve successful outcomes
- holistic thinking, 3d visioning,
- understanding, analysing and evaluation of various issues and appropriate responses
- communication and participation

The RIAI believe that architects would positively contribute on ways to improve people's quality of life, health, and wellbeing, through working with and enhancing our existing resources, to manage growth and development. All these skills are essential to the preparation of development plans.

A key example by illustration is where the key skillsets of architects translate the visions of the Development Plan objectives, expressing the relevant policies and ambitions to relevant stakeholders in a unique and visual manner. The inclusion of the Architect as an essential member of the core Development Plan team from the outset arms the team with the skillset to develop existing architectural expressions and respond with quality design solutions; ultimately improving quality of life as a result.

2.6

Resourcing the implementation of the Development Plan

The RIAI believe that the success of these Development Plan Guidelines will be dependent on the sufficient resourcing of our Local Authority Departments to ensure they have the correct skillsets and resources in order to facilitate the implementation of quality-driven development plans which are design focused in their approaches. This includes the appropriate skillset resourcing to each county, relevant to their requirements, to include professionals such as Qualified Architects as core members of the Development Plan teams, and an architectural conservation officer available to the development plan team in each county.

Section B

3.0 GREEN INFRASTRUCTURE

The following section outlines the urgency to conserve, enhance, and protect existing rural and urban green infrastructure and to look for ways to integrate nature into development plans and to improve the design of new wildlife habitats to replace those lost because of urban and rural developments.

3.1 Introduction

This submission outlines options for the incorporation of **Green Infrastructure (GI)** into Local Authority Development Plans. We start with an outline of some of the key environmental concerns in relation to biodiversity loss and climate change challenges that need to be addressed, and highlight those where GI may help mitigate the pressures on the environment and biodiversity.

3.2 Key environmental concerns

3.2.1 Climate Change

Climate change is 'widespread, rapid and intensifying' (IPCC 2021) and against the background of rising global greenhouse gas emissions (GHG) the 'Emissions Gap Report 2021' (UNEP 2021) states that "without immediate and deep emissions reductions across all sectors, limiting global warming to 1.5°C (2.7°F) is beyond reach." Furthermore, biodiversity and ecosystem services (see Section 2.2.1) have limited capacity to adapt to climate change (IPCC 2022a) and if we are to limit global warming to 1.5°C, GHG emissions must peak in 2025 and be reduced by 43% by 2030 (IPCC 2022b). Ireland's residential sector emits 12.3% of the country's greenhouse gas emissions¹. However, this figure rises to 35% when emissions from the entire built sector, including operational and embodied emissions, are considered (O'Hegarty and Kinnane 2022). Ireland has less than 8 years to meet the legally binding target of a 51% reduction of GHG emissions by 2030 as set out in the Climate Action Plan 2021 (Government of Ireland 2021).

3.2.2 Loss and Threats to Biodiversity and Associated Ecosystem Services

Insect and bird populations in Ireland are declining with as many as one third of our 102 wild bee species threatened with extinction (Fitzpatrick et al. 2007) and bird species that were common just a short time ago are now being red listed. There are 54 Irish bird species on the Red List (Table 1) which is the highest status of concern for their species (Gilbert et al. 2021). This represents 26% of the 211 species of Irish birds that were assessed. The kestrel for instance, until recently our most common falcon often seen hovering over fields and motorways, and the swift, a previously common summer visitor to urban areas, are now nearing extinction in Ireland.

Table 1: Birds of conservation concern in Ireland 2020-2026 Red-list species (high conservation concern).

Breeding	Passage	Wintering	Breeding and Wintering
Quail	Turtle Dove	Bewick's Swan	Eider
Grey Partridge	Balearic Shearwater	Long-tailed Duck	Common Scoter
Red Grouse	Curlew Sandpiper	Velvet Scoter	Pochard
Black-necked Grebe		Goldeneye	Shoveler
Stock Dove		Scaup	Oystercatcher
Nightjar		Slavonian Grebe	Golden Plover
Swift		Grey Plover	Lapwing
Corncrake		Bar-tailed Godwit	Curlew
Leach's Storm-petrel		Black-tailed Godwit	Dunlin
Woodcock		Knot	Snipe
Red-necked		Purple Sandpiper	Redshank
Phalarope		Snowy Owl	

¹ <https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/residential/>

Kittiwake	Redwing
Puffin	
Razorbill	
Barn Owl	
Golden Eagle	
White-tailed Eagle	
Red Kite	
Kestrel	
Wood Warbler	
Ring Ouzel	
Common Redstart	
Whinchat	
Meadow Pipit	
Grey Wagtail	
Twite	
Yellowhammer	

The situation is even worse for aquatic life in freshwater bodies due to pollution and habitat degradation (e.g. river drainage). A 2019 EPA report noted that 47% of river waterbodies and 50% of lakes were in unsatisfactory condition or polluted which represents a decline in water quality since the previous 2010-2015 assessment (O'Boyle et al. 2019). The authors stated that "We are continuing to see a loss of the pristine or Q5 ('best of the best') river waterbodies." Table 1 presents the range of Q-values and their interpretation. The 2019 report stated that there are now just 22 pristine river sites left in the country which is a severe reduction from over 500 pristine sites in the late 1980s. A more recent EPA indicators' report noted a small increase in Q5 sites but still only a fraction (1.4%) of those previously monitored (Trodd and O'Boyle 2021). This is likely contributing to the loss of aquatic biodiversity. For example, according to Kelly-Quinn et al. (2020) 28% of the invertebrate groups assessed using Red List methods are threatened and the situation is likely to be worse because some of these assessments are over 10 years old. Pristine sites are important reservoirs of aquatic biodiversity, and according to the EPA, their loss is of very significant concern.

Table 2: EPA River Quality Biological Ratings

Q Value	WFD Status	Pollution	Condition
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

3.2.3

Ecosystem Services

Ecosystem services are generally defined as 'the benefits people obtain from ecosystems' (MEA 2005) or 'the contributions that ecosystems make to human well-being' as outlined in the Common International Classification of Ecosystem Services (CICES) report (Haines-Young and Potschin 2013). These can be divided into Provisioning Services, the material outputs from ecosystem such as food and water, Regulating Services such as water purification, climate and flood regulation and carbon sequestration, and Cultural Services which include tangible (angling, kayaking, swimming) and less tangible benefits such as sense of place, aesthetic and spiritual values. It is important to note that the supply of these essential benefits is dependent on biodiversity and their ecosystem processes. Consequently, these benefits are reduced in quality (e.g. poor quality drinking water) or destroyed by biodiversity loss due to habitat degradation and pollution, all of which can be exacerbated by climate change. An example of these linkages in freshwaters is illustrated in Figure 1.

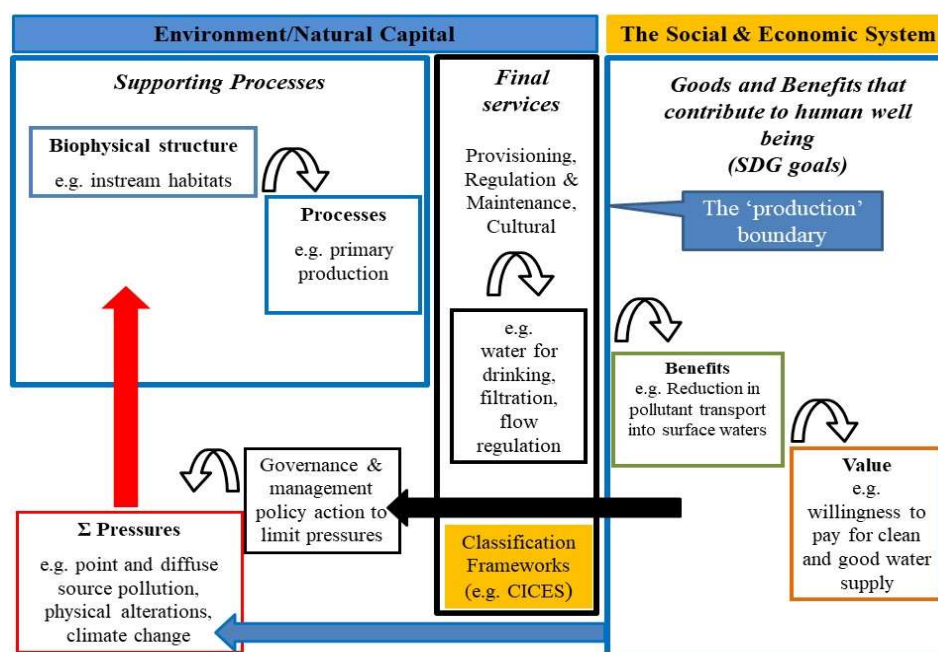


Figure 1: An illustration of the link between ecological processes and the good and benefits that humans derive from ecosystems. From: Kelly-Quinn et al. (2021 - modified after Potschin and Haines-Young (2011)).

3.3

Policy Context

A wide range of legislation and overarching EU policies (Figure 2) designed to improve environmental quality and thereby human well-being are of relevance. The European Green Deal's² focus is on climate change and sustainability which aims to achieve a 50% reduction in greenhouse gases by 2030, protect biodiversity and reduce air, soil and water pollution, and restore the natural environment while the Habitats³ and Birds⁴ Directives' focus is on the conservation of a wide range of rare, threatened or endemic animal and plant species. The Water Framework Directive (WFD)⁵ requires EU Member States to improve and protect the quality of surface and ground waters. Supporting legislation including directives relating to nitrates, groundwater and floods. The Ramsar Convention on Wetlands seeks to addresses the conservation of wetlands through national action and cooperation at a global level. The Strategic Plan for Biodiversity 2011–2020⁶ is to enhance the benefits to people from biodiversity and ecosystem services. The more recent EU Biodiversity Strategy 2030⁷ addresses the main drivers of biodiversity loss and sets goals for maintaining and restoring ecosystems and their services. At a global level environmental protection is central to the achievement of the 17 Sustainable Developments Goals (SDG) and their associated targets. Natura 2000⁸ is a network of core breeding and nesting sites for rare and threatened species that needs to be considered at the planning stage. Of particular relevance is the European Commission's Communication on GI which emphasises "the important role of natural capital and the value of the ecosystem services concept as providing an integrating and balanced perspective in policy making, planning and management of ecosystems".

² https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

³ https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

⁴ <https://ec.europa.eu/environment/nature/info/pubs/docs/brochures/nat2000/en.pdf>

⁵ https://ec.europa.eu/environment/water/water-framework/index_en.html

⁶ <https://www.cbd.int/sp/>

⁷ https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

⁸ https://ec.europa.eu/environment/nature/natura2000/index_en.htm



Figure 2: Range of legislation and policies of relevance to Green Infrastructure

A definition of Green Infrastructure from the European Commission is given below in Box 1. As can be seen it is much more than playing fields and manicured parks. It comprises the networks of trees, parks, green spaces, rivers, lakes and canals that lie within and between our towns and cities that help make urban and rural areas more robust in the face of climate change. Traditionally GI has taken second place to urban development. However, the ecosystem services and the wider benefits that GI provides are beginning to be recognised by policymakers, planners and wider society. Many of the benefits of GI are outlined in Figure 3. It creates a better work environment, reduces pollution and the provision of footpaths, cycleways and linkages helps to reduce traffic congestion and enables healthy low-cost recreation. Green infrastructure also helps local authorities meet their legal obligations under various Irish and EU legislation (e.g. the Birds and Habitats Directives) by making space for wildlife and by creating wildlife corridors between fragmented wildlife habitats. The biodiversity of existing open spaces and riparian ecosystems along waterways, which has been severely damaged by human activities, can be rehabilitated.

All future developments and refurbishment of existing developments must be viewed through the prism of the climate and biodiversity emergency. If properly designed, GI can help mitigate some of the worst effects of climate change. In general GI has the potential to contribute hugely to our overall well-being.

Box 1: What is Green Infrastructure?

“Green Infrastructure can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings.

More specifically GI, being a spatial structure providing benefits from nature to people, aims to enhance nature’s ability to deliver multiple valuable ecosystem goods and services, such as clean air or water” (European Commission 2013 - Building a Green Infrastructure for Europe).

4.1 Types of Green Infrastructure

4.1.1 Wetlands

Wetlands are among the most threatened ecosystems. These habitats range from blanket bogs, fens and raised bogs to rivers, lakes, marshes, swamps, aquifers, springs and coastal waters. Also included in this category are constructed wetlands, ponds and swales. Wetlands deliver a wide range of ecosystem services such as water, climate and flood regulation, coastal protection, recreational opportunities, and tourism. According to the Millennium Ecosystem Assessment, (2005) the main causes of the loss and degradation of wetlands are “infrastructure development, land conversion, water withdrawal, eutrophication and pollution, overharvesting, overexploitation, and the introduction of invasive alien species”. The continued loss and degradation of wetlands will reduce their ability to provide the ecosystem services that we depend on.

4.1.2 Rivers and Riparian Zones

Riparian zones represent the interface or ecotone between terrestrial and aquatic systems. These too are under significant pressure from anthropogenic activities. Apart from contributing to landscape aesthetics, supporting biodiversity, and providing wildlife corridors, riparian zones are also important in helping to intercept pollution before it enters surface waters. Other services provided by riparian vegetation are outlined in Riis et al. (2020). The deterioration and homogenisation of river habitats is a major issue and measures to protect streams and rivers from elevated fine sediment inputs should be built into green infrastructure planning. Pesticides and herbicides used by the local authority and homeowners are seriously damaging to aquatic biodiversity (Kelly-Quinn et al. 2020). GI should include measures to buffer rivers and streams from biocide runoff and should generally be at the core of all GI planning.

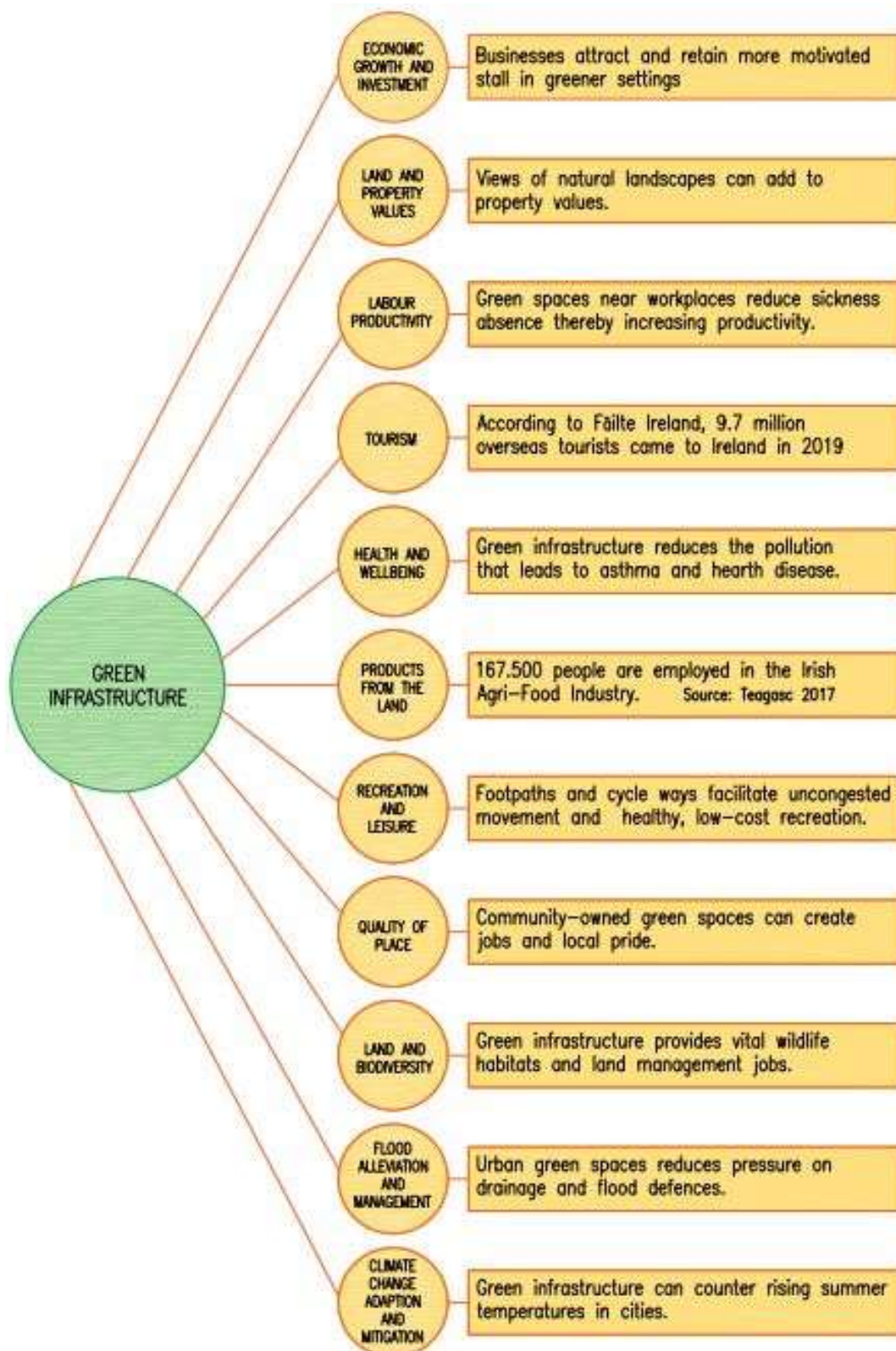


Figure 3: Some of the benefits of Green Infrastructure – modified from the Green Infrastructure Toolkit available at http://www.ginw.co.uk/resources/gi_toolkit.xls

4.1.3

Trees, Woodlands and Hedgerows

Woodlands, trees and hedgerows are important natural habitats that contribute hugely to the rural and urban landscapes. The wildlife habitat provided by hedgerows are rich and diverse, similar to the outer edge of a native woodlands. They also provide important wildlife corridors and linkages between fragmented habitats.

Native trees and shrubs, i.e. those that arrived in Ireland without human intervention, have been here for thousands of years. They support a wide variety of wildlife because the native vegetation and associated fauna have evolved together over the millennia. However, the decline in insect population is a growing and serious problem which threatens a “catastrophic collapse of nature’s ecosystems” (Sánchez-Bayo and Wyckhuys 2019). As well as capturing carbon and airborne pollution, trees support a wide variety of beneficial insect populations. Table 3 below provides a list of trees that are most beneficial to insect populations.

Table 3: Number of insect species supported by some Irish native trees.

Tree species	Number of insects
Oak (<i>Quercus</i>)	284
Willow (<i>Salix</i>)	266
Birch (<i>Betula</i>)	229
Hawthorn (<i>Crataegus</i>)	149
Blackthorn (<i>Prunus</i>)	109
Alder (<i>Alnus</i>)	90
Hazel (<i>Corylus</i>)	73
Ash (<i>Fraxinus</i>)	41

From: Beckett and Beckett (1979)

4.1.4

Grassland

Improved agricultural grassland is generally of a monocultural nature and is of low biodiversity value. However, semi-natural grasslands which are not intensively managed such as old permanent pastures and the now rare hay meadows, which are rarely fertilised or grazed, have a wide variety of grasses and flowering plant species. This type of wildlife rich habitat is now largely confined to field and roadside verges, railway embankments, cemeteries and churchyards (Fossitt 2000).

4.1.5

Green Roofs and Green Walls

According to Berardi et al. (2014) green roofs, if properly designed, can help replace lost green spaces and habitats in modern cities. The potential for green roofs and green walls to become 3D urban wildlife corridors is considered by Mayrand and Clergeau (2018). However, the authors recognise the limits of these systems due their scale and patchy distribution and to the quality of the habitats that they provide. The authors go on to say that while green roofs and green walls offer habitats to species that adapt to urban areas, they will generally not be large enough to cater for species that avoid urban areas.

Green roofs and green walls have other contributions to make to the urban environment. According to Hoebein and Posch (2021) they reduce stormwater runoff and filter it before it enters ground and surface waterbodies. The authors go on to report that green roofs and walls help to improve air quality and regulate urban temperatures.

5.0

GREEN INFRASTRUCTURE TOOLS

5.1

Green Space Factor and Green Points System

The city of Malmö in Sweden has developed a GI planning tool that has been successfully used in new developments. Kruuse (2011) outlines the processes involved and the results achieved when using the Green Space Factor and Green Points System, the two functions of the GI planning tool.

5.1.1

The Green Space Factor

The Green Space Factor (Malmo 2001), also known as the Biotope Area Factor (Berlin 1994) and the Green Factor (Seattle 2007), is a method of calculating green space requirements for new development. It is based on the principle that small scale, incremental and decentralised GI can have a cumulative effect to improve the ecology of a development area. Impacts of a development are mitigated by putting measures in place to enhance biodiversity and manage rainwater.

The Green Space Factor is calculated as:

$$\text{GSF} = \frac{(\text{area A} \times \text{factor A}) + (\text{area B} \times \text{factor B}) + (\text{area C} \times \text{factor C}) + \text{etc.})}{\text{total courtyard area}}$$

The method involves assigning factors to different surface types that vary from 1 to 0 depending on the surface type (Table 4). For instance, a factor of 1 for vegetation in contact with groundwater to 0 for sealed surfaces. High values are assigned to elements such as green roofs, large trees and green walls. Factors assigned to each surface types are multiplied by the area of each surface type. The multiples are added together, and the total divided by the total area of the different surface types to give the overall Green Space Factor.

5.1.2 **The Green Points System**

While the Green Space Factor differentiates between different types of GI surface cover, it is not sufficient to ensure biodiversity features are included in a development. For example, the Green Space Factor does not differentiate between a species poor, mown lawn and a species rich wildflower meadow or a green roof that is devoid of wildlife with one that is rich in biodiversity. The introduction of the Green Points System (Table 5) provides an additional scoring mechanism that delivers a more biodiverse green infrastructure. In the Green Points System outlined in Kruuse (2011) there are 35 green point options ranging from 1 to 35. Developers are required to include at least 10 of the 35 options in their landscape designs proposal before calculating the Green Space Factor.

5.2 **The Green Infrastructure Toolkit**

The Green Infrastructure toolkit which was adapted in England from Malmö's Green Space Factor and Green Points System is presented in a series of Excel spreadsheets to help developers determine the Green Infrastructure Score of the whole development site. The existing BREEAM 'Very Good' term which is understood by developers, is used to describe the Green Infrastructure Score. GI requirements for a site with existing built structures differ from that of a green field site. The Green Infrastructure Score of a site with existing structures is calculated prior to the commencement of the development and compared with the calculated GI Score of the proposed development. To achieve a 'Very Good' score the proposal for the new development on a brown field site must be at least 0.2 higher than the score for the existing structures on the site. A development for a green field site on the other hand must score a minimum 0.6 to reach 'Very Good'. The Toolkit has 71 suggested GI 'interventions' that developers can use to increase their GI score. The interventions which, relate to tree cover, green roofs and walls, general vegetation, water, connectivity and any other intervention that the developer deems appropriate, are grouped, in the Excel spread sheet, according to economic benefits outlined in Figure 3 that GI provides. Developers can use the Toolkit at an early stage to inform the design of the site while taking account of existing GI plans or strategies for the area.

Table 4: Green Space Factor for each surface type.

Surface type	Factor
Vegetation on ground	1.0
Vegetation on trellis or facade	0.7
Green roofs	0.6
Vegetation on beams, soil depth between 200 mm and 800 mm	0.7
Vegetation on beams, soil depth more than 800 mm	0.9
Water surfaces	1.0
Collection and retention of stormwater	0.2
Draining of sealed surfaces to surrounding vegetation	0.2
Sealed areas	0.0
Paved areas with joints	0.2
Areas covered with gravel or sand	0.4
Tree, stem girth 16-20 centimetres (20 square metres for each tree)	20.0
Tree, stem girth 20-30 centimetres (15 square metres for each tree)	15.0
Tree, stem girth more than 30 centimetres (10 square metres for each tree)	10.0

Solitary bush higher than 3 metres (2 square metres for each bush) 2.0

From Kruuse (2011)

Table 5: Green Points System

Points	Green point options
1	A bird box for every apartment
2	A biotope for specified insects in the courtyard (pond skaters and other aquatic insects in the pond)
3	Bat boxes in the courtyard
4	No surfaces in the courtyard are sealed, and all surfaces are permeable to water
5	All non-paved surfaces within the courtyard have sufficient soil depth and quality for growing vegetables
6	The courtyard includes a rustic garden with different sections
7	All walls, where possible, are covered with climbing plants
8	There is 1 square metre of pond area for every 5 square metres of hard-surface area in the courtyard
9	The vegetation in the courtyard is selected to be nectar rich and provide a variety of food for butterflies (a so-called 'butterfly restaurant')
10	No more than five trees or shrubs of the same species
11	The biotopes within the courtyard are all designed to be moist
12	The biotopes within the courtyard are all designed to be dry
13	The biotopes within the courtyard are all designed to be semi-natural
14	All stormwater flows for at least 10 metres on the surface of the ground before it is diverted into pipes
15	The courtyard is green, but there are no mown lawns
16	All rainwater from buildings and hard surfaces in the courtyard is collected and used for irrigation
17	All plants have some household use
18	There are frog habitats within the courtyard as well as space for frogs to hibernate
19	In the courtyard, there is at least 5 square metres of conservatory or greenhouse for each apartment
20	There is food for birds throughout the year within the courtyard
21	There are at least two different old-crop varieties of fruits and berries for every 100 square metres of courtyard
22	The facades of the buildings have bird nesting facilities
23	The whole courtyard is used for the cultivation of vegetables, fruit and berries
24	The developers liaise with ecological experts
25	Greywater is treated in the courtyard and re-used
26	All biodegradable household and garden waste is composted
27	Only recycled construction materials are used in the courtyard
28	Each apartment has at least 2 square metres of built-in growing plots or flower boxes on the balcony
29	At least half the courtyard area consists of water
30	The courtyard has a certain colour (and texture) as the theme
31	All the trees and bushes in the courtyard are native.
32	The courtyard has trimmed and shaped plants as its theme
33	A section of the courtyard is left for natural succession (that is, to naturally grow and regenerate)
34	There are at least 50 flowering native wild herbs within the courtyard
35	All the buildings have green roofs

Adapted from Kruuse (2011)

6.0 PROMOTING GREEN INFRASTRUCTURE IN PLANNING AND DEVELOPMENT

There is clearly a need to recognise and mitigate the dramatic loss of biodiversity, environmental degradation and the growing issues relating to climate change. Existing green infrastructure and properly designed new GI have a roll to play in addressing these growing concerns. Planning and promoting the use of GI can be at a number of levels as outlined section 6.1.

6.1 County Development Plans

As with all planning and development, incorporation of GI needs to be strategic to maximise the benefits that it can provide and be cognisant of the trade-offs that may need to be considered. Having identified the pressures or key issues that GI can address, County Development Plans should develop and introduce similar evidence-based methods as outlined by Kruuse (2011) to quantify the amount of green infrastructure that developers need to include in their proposals in order to get through the planning process. Similar approaches should be developed for all local authority projects that will potentially impact existing GI and for the creation of new GI. These should align with other local authority strategies and investment plans and should state who will provide the infrastructure and when it will be provided. This will help ensure that the many benefits of GI are not just confined to the leafy suburbs.

Importantly, a strategy is required to support and enable knowledge conversion and communication to raise awareness among all sectors of the population, from policy makers to citizens, and to inform the practical application of GI in development projects. This could include the development of demonstration sites to showcase nature-based solutions with existing land uses.

6.1.1 Ecological Connectivity

It is important to address habitat fragmentation through the use of GI. Road verges, greenways and riparian zones are linear features in the landscape that provide important wildlife habitats and corridors that link fragmented habitats. The wildlife potential of these linkages should be maximised by planting trees, shrubs and flowers for pollinators that are native to the area.

In terms of tree planting, development plans should include quantifiable annual targets and the design should be of a tiered vegetation structure to include a) a distinct canopy of native trees, b) native shrub layer and c) native ground layer.

Existing sensitive habitats such as riparian woodland, mixed broadleaf woodland and riparian zones require protection when designing access roads, greenways, walkways and areas for amenity as they contain wildlife habitats and many of them act as buffers to waterbodies.

Development plans should also include agreed joint action plans to protect wildlife habitats that straddle local authority boundaries.

6.1.2 Wetlands and River Basin Management

Development plans should set out how they will contribute to river basin management. This is extremely important if the decline in river water quality is to be reversed. Plans should be put in place to reinstate natural river features and to remove unnatural features such as weirs. Where possible culverted streams should be opened to allow fish to move freely, and new culverts and bridges should be designed to avoid the creation of barriers to fish (Kelly-Quinn et al. 2022). Proposed nearby developments should be appropriately assessed to guarantee protection of riparian zones.

An action plan to control and eliminate invasive alien species especially in waterbodies and riparian zones is required to comply with the Birds and Habitats Regulations. An action plan is also required to ensure the conservation of remaining wetlands, identify sites that warrant special protection and to provide data that enables their protection under the Ramsar Convention on Wetlands

6.1.3

Public Lighting

Apart from the vast amounts of energy they use, with the inevitable contribution to carbon emissions, there are environmental and health implications associated with public street lighting. According to Ngarambe, et al. (2018) street lighting causes light pollution, which has consequences for animals and plants. The following suggestions from the EU COST Action Loss of Night Network (LoNNe)⁹ to combat light pollution will also improve the energy-efficiency and the environmental and human health issues associated with public street lighting.

1. Every light needs to be justifiable
2. Limit the use of light to when it is needed
3. Direct the light to where it is needed
4. Reduce the light intensity to the minimum needed
5. Use light spectra adapted to the environment
6. When using white light, use sources with a “warm” colour temperature (less than 3000K)

7.0

CONCLUSION & KEY ACTIONS

We urgently need to address the causes of climate change and the catastrophic decline of biodiversity and the associated widespread environmental degradation. GI has a definite role to play in mitigating some of the damage caused by urban or rural developments. It is up to local authorities to ensure that developers protect existing GI and provide adequate GI that creates a wide range of wildlife habitats and biodiverse features. The following is a summary of key actions that should be included in development plans:

1. Enhance the use of GI to mitigate the impact that climate change will have on ecosystem services and consequently on society.
2. Take definite steps to mitigate the impact that developments have on biodiversity by developing GI tools similar to those used elsewhere in Europe and the U.S.
3. Improve enforcement of planning conditions to ensure GI elements are properly included in new developments.
4. Carry out frequent random inspections of wastewater treatment plants to confirm that they are installed correctly and not causing pollution.
5. Develop a communication strategy to raise public awareness of the importance of GI and to inform the practical application of GI in development projects.
6. Improve the biodiversity of existing GI as follows:
 - Protect existing wild places especially wetlands and riparian zones.
 - Eliminating the use of chemicals and herbicides in the vicinity of watercourses and minimise their use elsewhere.
 - Construct new ponds and wetlands that contain aquatic and fringing vegetation native to the area.
 - Create wildflower meadows using wildflower seeds that are native to the locality.
 - Set ambitious targets for planting native trees and shrubs and allow scrub vegetation to develop in places.
 - Draw up an action plan to control and eliminate invasive alien species.
 - Increase biodiversity of roadside verges by introducing a maintenance regime that involves the following;

Mow roadside verges just twice-yearly using mowers that collect the grass (over time, this will reduce the fertility of the soil and allow wildflowers to compete with grass). First cut should be early in the year (not later than February) with the second cut in September / October.

⁹ <http://www.cost-lonne.eu/recommendations/>

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