

PERFECT
expert paper 3



what does good green infrastructure policy look like?

developing a policy assessment tool to assess plans, policies and programmes



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PERFECT project – Planning for Environment and Resource efficiency in European Cities and Towns

PERFECT Expert Paper 3: *What Does Good Green Infrastructure Policy Look Like? Developing a Policy Assessment Tool to Assess Plans, Policies and Programmes*

By Alister J Scott and Max Hislop

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About PERFECT

PERFECT (Planning for Environment and Resource efficiency in European Cities and Towns) is a five-year project, running from January 2017 to December 2021, co-funded by Interreg Europe. It aims to demonstrate how the multiple uses of green infrastructure can provide social, economic and environmental benefits. It will raise awareness of this potential, influence the policy-making process, and encourage greater investment in green infrastructure.

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1 What is green infrastructure?

The term 'green infrastructure' (GI) was first used in the US in 1994,¹ to emphasise that planning's role to protect and restore the natural environment was just as important as planning for 'grey' infrastructure.² Its roots and focus were diverse; within the UK/EU they lay in ecological networks and connectivity, while in the US they were in managing stormwater run-off. Its use among built environment professionals spawned separate definitions, interpretations, approaches and principles, as shown in Table 1 on pages 4 and 5. Such diversity is a strength in terms of GI's flexibility and multi-functionality, but it is also a weakness in terms of its intangibility and elusiveness. In the morass of definitions encountered in the literature we contend that the EU definition (as set out in 2015) is one of the more useful in capturing the core components of GI from a spatial planning perspective:

*'Green infrastructure is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services, such as water purification, air quality, space for recreation, and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity.'*³

The ingredients of green infrastructure

The core premise of GI planning is that it ***adds value as a deliberately managed multi-functional network*** of green and blue features, ***operating across multiple scales***. This network is ***purposefully designed to deliver multiple benefits***, thus ***contributing more than a simple collection of individual green space assets or features***. Consequently, GI performs multiple functions: as an integrative concept, a delivery mechanism, and a planning approach. This includes individual elements/features, such as green roofs, as well as linked networks, and incorporates existing natural features such as woodlands in planned interventions. Thus, it has significant potential to deliver nature-based solutions to specific challenges – for example through creating connected green corridors for wildlife and people at the landscape scale; designing and locating GI to provide air pollution barriers between roads and schools; or incorporating measures to address the climate emergency declarations now widespread among local authorities and agencies across the EU. Indeed, Benedict and McMahon⁴ view GI ***not as a luxury or bolt-on, but as essential critical infrastructure*** that should be prioritised in the same vein as its grey counterpart.

Today, GI has matured significantly as a strategic concept in planning policy and practice at international, national, regional and local scales, leading Jerome *et al.*⁵ to claim, perhaps prematurely, that the 'advocacy argument has been won'. However, there

1 K Firehock: *A Short History of the Term Green Infrastructure and Selected Literature*. Green Infrastructure Center, Jan. 2020. <http://www.gicinc.org/PDFs/GI%20History.pdf>

2 Grey infrastructure covers the built fabric of cities using concrete and steel and other non-living material to create roads, drains, dams, dykes, etc.

3 'Ecosystem services and green infrastructure'. Webpage. European Commission, 2015. http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

4 M Benedict and E McMahon: *Green Infrastructure: Linking Landscapes and Communities*. Island Press, 2006

5 G Jerome, D Sinnett, S Burgess, T Calvert and R Mortlock: 'A framework for assessing the quality of green infrastructure in the built environment in the UK'. *Urban Forestry & Urban Greening*, 2019, Vol. 40, Apr., 174-82



Planners at a workshop developing and testing the policy assessment tool reported here

remains significant concern over its value and delivery, with a notable deficit in research and practice on the efficacy of GI planning policies,⁶ raising a fundamental question of what good GI policy looks like.

The role of this Expert Paper

This Expert Paper answers the question ‘what does good GI policy look like’ by reporting on the design and testing of a hybridised GI policy tool which assesses the multi-functionality and strength of GI policy wording using the recently revised English National Planning Policy Framework (NPPF)⁷ and Planning Policy Wales 10 (PPW10) as illustrative case studies.⁸ While these are national level policy frameworks, the tool has multi-scalar application at regional and municipality/local authority and neighbourhood levels for both statutory and non-statutory plans. The tool is the result of a fusion of key GI research and practice endeavours; a pilot involving 19 local authorities within the Central Scotland Green Network (CSGN) area;⁹ the Natural Environment Research Council (NERC) Building with Nature standards research project;¹⁰ the Glasgow Clyde Valley (GCV) Green Network Partnership’s Integrating Green Infrastructure (IGI) Approach;¹¹ and a NERC-funded knowledge exchange project on mainstreaming GI.¹²

This Expert Paper proceeds with a review of GI barriers and opportunities before then detailing the development of the self-assessment tool and explaining the methodology involved in carrying out a plan assessment. Thereafter, it reports the findings of the NPPF and PPW10 assessments and considers the specific and general implications that they have for the design and delivery of good GI policy in practice across England and Europe.

6 CM Johns: ‘Understanding barriers to green infrastructure policy and stormwater management in the City of Toronto: a shift from grey to green or policy layering and conversion?’. *Journal of Planning & Environmental Management*, 2019, Vol. 62 (8), 1377-401

7 *National Planning Policy Framework*. CP 48. Ministry of Housing, Communities and Local Government, Feb. 2019. <https://www.gov.uk/government/publications/national-planning-policy-framework-2>

8 *Planning Policy Wales. Edition 10*. Welsh Government, Dec. 2018.

<https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf>

9 M Hislop, AJ Scott and A Corbett: ‘What does good green infrastructure planning policy look like? Developing and testing a policy assessment tool within Central Scotland’. *Planning Theory & Practice*, 2019, Vol. 20(5), 633-55

10 G Jerome, D Sinnett, S Burgess, T Calvert and R Mortlock: ‘A framework for assessing the quality of green infrastructure in the built environment in the UK’. *Urban Forestry & Urban Greening*, 2019, Vol. 40, Apr., 174-82

11 For design study details from the Integrating Green Infrastructure (IGI) Approach, see the GCV Green Network Partnership’s ‘Delivering green infrastructure’ webpages, at <https://www.gcvgreennetwork.gov.uk/what-we-do/delivering-green-infrastructure>

12 A Scott: ‘Mainstreaming green infrastructure’. Webpage. <https://mainstreaminggreeninfrastructure.com/index.php>

Table 1
Encountered definitions and foci of green infrastructure

GI focus	Definition
Connected and managed network of multiple benefits for people	'An interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife.' [Emphasis added] (Benedict and McMahon ⁱ)
	'A strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas.' [Emphasis added] (European Commission ⁱⁱ)
	'The biological resources in urban areas that are human modified and primarily serve an overt function and which are intentionally designed and employed primarily for widespread public use and benefit. ' [Emphasis added] (Mell ⁱⁱⁱ)
	'If designed and sited appropriately, UGI [urban green infrastructure] can represent nature based solutions to interrelated issues associated with urbanisation that are relevant to all public authorities. This includes flooding, urban heat island, air quality, recycling, biodiversity and health & well-being of communities.' [Emphasis added] (Connop <i>et al.</i> ^{iv})
Multi-functionality	'The concept of multifunctionality in GI planning means that multiple ecological, social, and also economic functions shall be explicitly considered instead of being a product of chance. Multifunctionality aims at intertwining or combining different functions and thus using limited space more effectively.' [Emphasis added] (Hansen and Pauleit ^v)
	'"Multi-functionality" in the context of green infrastructure stands for a broad understanding of functions (including, for example, buffering of climatic extremes, biomass production, provision of habitats and species movement routes or opportunities for social interaction and nature experience.' [Emphasis added] (Hansen <i>et al.</i> ^{vi})
Integration and conflict management	'The green infrastructure approach thus provides a comprehensive framework to accommodate competing interests and, in practice, to engage environmental objectives and dominant economic imperatives.' [Emphasis added] (Matthews <i>et al.</i> ^{vii})
	'It is crucial for practitioners to understand 'green infrastructure' and how it is used and shaped in practice in order to enhance the potential of the concept through negotiation. This may also open up opportunities to gain positive impacts of ambiguity such as 'creative outcomes' and 'joined up' thinking.' [Emphasis added] (Wright ^{viii})

- i M Benedict and E McMahon: *Green Infrastructure: Linking Landscapes and Communities*. Island Press, 2006
- ii *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Green Infrastructure (GI) – Enhancing Europe's Natural Capital. Green Infrastructure Strategy. COM(2013) 249 final. European Commission, May 2013, p.3. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0249>*
- iii I Mell: 'Integrating green infrastructure within landscape perspectives to planning'. In M Scott, N Gallent and M Gkartzios (Eds): *The Routledge Companion to Rural Planning*, 2019, Chap. 42
- iv S Connop, P Vandergerta, B Eisenberg, MJ Collier, C Nasha, J Clough and D Newport: 'Renaturing cities using a regionally-focused biodiversity-led multifunctional benefits approach to urban green infrastructure'. *Environmental Science & Policy*, 2016, Vol. 62, Aug., 99-111
- v R Hansen and S Pauleit: 'From multifunctionality to multiple ecosystem services? A conceptual framework for multifunctionality in green infrastructure planning for urban areas'. *Ambio*, 2014, Vol. 43, 516-29
- vi R Hansen, AS Olafsson, PN Alexander, E Rall and S Pauleit: 'Planning multifunctional green infrastructure for compact cities: What is the state of practice?'. *Ecological Indicators*, 2019, Vol. 96, 99-110
- vii T Matthews, AY Lo and JA Byrne: 'Reconceptualizing green infrastructure for climate change adaptation: Barriers to adoption and drivers for uptake by spatial planners'. *Landscape & Urban Planning*, 2015, Vol. 138, 155-63
- viii H Wright: 'Understanding green infrastructure: the development of a contested concept in England'. *Local Environment*, 2011, Vol. 16(10), 1003-19

Table continued on page 5

Table 1 – Continued
Encountered definitions and foci of green infrastructure

GI focus	Definition
Delivery at, and across, multiple scales	Green infrastructure includes established green spaces and new sites and should thread through and surround the built environment and connect the urban area to its wider rural hinterland. Consequently, it needs to be delivered at all spatial scales from sub-regional to local neighbourhood levels, accommodating both accessible natural green spaces within local communities and often much larger sites in the urban fringe and wider countryside.' [Emphasis added] (Natural England ^{ix}) 'It can be considered to comprise of all natural, semi-natural and artificial networks of multifunctional ecological systems within, around and between urban areas, at all spatial scales. The concept of Green Infrastructure emphasises the quality as well as quantity of urban and peri-urban green spaces. ' [Emphasis added] (Tzoulas <i>et al.</i> ^x)
Engineering systems and SMART technologies	'An adaptable term used to describe an array of products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services.' [Emphasis added] (US Environmental Protection Agency ^{xi})
Public Participation	'However, due to green infrastructure's considerable societal benefits, all groups of society should have a say in its planning and implementation to ensure that it meets their requirements. ' [Emphasis added] (Wilker <i>et al.</i> ^{xii})
Social Justice and equity	'Over the past two decades, the uneven accessibility of urban green space has become recognized as an environmental justice issue as awareness of its importance to public health has become recognized.' [Emphasis added] (Wolch <i>et al.</i> ^{xiii})
Narratives	'In all three cases, framing and telling stories about green infrastructure play a crucial role. In the Ruhr, the term green infrastructure is directly used to stimulate regional debates on sustainability, while green infrastructure rhetoric in Manchester has been interrupted due to institutional shifts. In the Capital Region of Denmark, it is obsolete and embedded in other local discourses, i.e. climate change adaptation.' [Emphasis added] (Remier and Rusche ^{xiv})

ix *Green Infrastructure Guidance*. NE 176. Natural England, Jan. 2009.

<http://publications.naturalengland.org.uk/publication/35033>

x K Tzoulas, K Korpela, S Venn, V Yli-Pelkonen, A Kazmierczak, J Niemela and P James: 'Promoting ecosystem and human health in urban areas using green infrastructure: A literature review'. *Landscape & Urban Planning*, 2007, Vol 81 (3), 167-78

xi 'Green infrastructure glossary'. Webpage. US Environmental Protection Agency. https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&glossaryName=Green%20Infrastructure%20Glossary

xii J Wilker, K Rusche and C Rymsa-Fitschen: 'Improving participation in green infrastructure planning'. *Planning Practice & Research*, 2016, Vol. 31 (3), 229-49

xiii J Wolch, JA Byrne and JP Newell: 'Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough''. *Landscape & Urban Planning*, 2014, Vol. 125, 224-34

xiv M Reimer and K Rusche: 'Green infrastructure under pressure. A global narrative between regional vision and local implementation'. *European Planning Studies*, 2019, Vol. 27 (8), 1542-63

Source: M Hislop, AJ Scott and A Corbett: 'What does good green infrastructure planning policy look like? Developing and testing a policy assessment tool within Central Scotland'. *Planning Theory & Practice*, 2019, Vol. 20(5), 633-55

2 Barriers to green infrastructure delivery

European planning systems face significant strategic challenges, including reconciling different agendas and priorities, such as public health, water management, housing supply, economic growth, biodiversity loss, and climate change.¹³ However, these challenges are often diagnosed and treated within separate sectoral silos, leading to disintegrated development,¹⁴ amid contested visions of what success actually looks like.¹⁵

GI can form part of nature-based solutions to address these planning challenges, particularly when positioned within more holistic social-ecological systems thinking.¹⁶ However, current delivery of GI policy objectives is all too often trumped by other 'essential' policy priorities associated with economic growth and development. Here, GI is not perceived as essential to a successful development, and consequently suffers from relatively weak policy wording.¹⁷

Definitional barriers – overcoming silos

GI can all too easily become obfuscated within a desire to seek GI definitional purity.¹⁸ In this vein, the term itself does no favours. With its explicit 'green' credentials, it can all too easily obscure the blue and other living components of GI from view, and its expert-led language can hinder its understanding across multiple publics. Here the confusion and conflation of GI with green space is widespread, which can dilute the value of GI as a strategic spatial planning tool.¹⁹

GI is also treated primarily as an environmental concept and thus not readily equated with other grey infrastructure that supports business, housing or economic development needs. This is reinforced by the tendency for GI to be championed within its own specialised environmental silo rather than being 'mainstreamed' and normalised into the daily practices of other stakeholder groups and sectors.²⁰ Here, effective mainstreaming necessitates a managed process of change which requires engaging with other publics/stakeholders (outside the environmental domain) on their own terms and translating GI into their own vocabularies and priorities. This is rarely done, which tends to strengthen existing policy silos and hinder the desired integration.

13 J Wilker, K Rusche and C Ryma-Fitschen: 'Improving participation in green infrastructure planning'. *Planning Practice & Research*, 2016, Vol. 31 (3), 229-49

14 AJ Scott, C Carter, MR Reed, P Larkham, *et al.*: 'Disintegrated development at the rural-urban fringe: Re-connecting spatial planning theory and practice'. *Progress in Planning*, 2013, Vol. 83, 1-52

15 JM Leach, RA Mulhall, CDF Rogers and JR Bryson: 'Reading cities: Developing an urban diagnostics approach for identifying integrated urban problems with application to the city of Birmingham, UK'. *Cities*, 2019, Vol. 86, Mar., 136-44

16 S Connop, P Vandergerta, B Eisenberg, MJ Collier, C Nasha, J Clough and D Newport: 'Renaturing cities using a regionally-focused biodiversity-led multifunctional benefits approach to urban green infrastructure'. *Environmental Science & Policy*, 2016, Vol. 62, Aug., 99-111

17 W McWilliam, R Brown, P Eagles and M Seasons: 'Evaluation of planning policy for protecting green infrastructure from loss and degradation due to residential encroachment'. *Land Use Policy*, 2015, Vol. 47, Sept., 459-67

18 H Wright: 'Understanding green infrastructure: the development of a contested concept in England'. *Local Environment*, 2011, Vol. 16(10), 1003-19

19 T Matthews, AY Lo and JA Byrne: 'Reconceptualizing green infrastructure for climate change adaptation: Barriers to adoption and drivers for uptake by spatial planners'. *Landscape & Urban Planning*, 2015, Vol. 138, 155-63

20 AJ Scott, C Carter, M Hardman, N Grayson and T Slaney: 'Mainstreaming ecosystem science in spatial planning practice: exploiting a hybrid opportunity space'. *Land Use Policy*, 2018, Vol. 70, Jan., 232-46

To address this, Scott *et al.*²¹ proposed the twin mechanisms of 'hooks' (linking the GI concept to a key policy or legislative term, duty or priority that relates to a particular user group – such as place-making) and 'bridges' (linking the GI concept to a term, concept or policy priority that is used and readily understood across multiple groups and publics – such as the climate emergency, nature-based solutions, and multiple benefits) as key 'translation' mechanisms. This enables traction to be secured to engage with key gatekeepers meaningfully in order to help build stronger mainstreaming narratives; moving, it is hoped, through stages from awareness to persuasion to adoption to confirmation.²² Making such connections within other policy areas, on their own terms, becomes crucial in breaking down GI barriers.

Financial barriers

The financial barrier represents one potent barrier to overcome. GI does not easily generate direct financial revenue to GI managers or providers (for example via taxes and donations), although considerable progress has been made with payments for ecosystem services schemes.^{23,24} Thus GI benefits often occur as external effects, where those paying for the provision are not necessarily those who directly benefit most, particularly when cultural and regulating services such as flood risk management and health benefits are involved. Consequently, cutting resources for GI planning, management and delivery is widespread as the benefits of GI investments are not easy to capture or to transfer.²⁵ This is exacerbated by the more tangible costs of maintenance which impact negatively on budgets such as those for parks and leisure services departments, thus perpetuating the image that GI is a cost and drain on resources. This is also evident in the delivery phases on many development schemes. When a scheme starts to exceed planned costs, GI is one of the first casualties owing to its vulnerable status as an optional extra that is not deemed essential to a development.

Capturing long-term GI benefits

The demand for GI is also not easy to define and assess against quantifiable metrics and indicators, a difficulty compounded by the political desire to secure short-term financial gains from development on the one hand and the environmental desire to secure long-term benefits delivered by GI on the other. However, the tension between short- and long-term considerations is skewed by the way that conventional accounting and business case methods often treat GI as a liability, ignoring the wider benefits to society, including improved health and wellbeing, flood risk regulation, biodiversity, etc., simply because they are not readily accounted for. Ironically, the associated management and maintenance costs for GI are costed, however.²⁶

Hence GI becomes unattractive in the absence of a coherent business case: we tend to value what is measurable rather than attempt to measure what we most value.

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- 21 AJ Scott, C Carter, M Hardman, N Grayson and T Slaney: 'Mainstreaming ecosystem science in spatial planning practice: exploiting a hybrid opportunity space'. *Land Use Policy*, 2018, Vol. 70, Jan., 232-46
 - 22 AJ Scott: 'Mainstreaming the environment in planning policy and decision making'. In S Davoudi, R Cowell, I White and H Blanco: *The Routledge Companion to Environmental Planning and Sustainability*. Routledge, 2019
 - 23 *Payments for Ecosystem Services: A Best Practice Guide*. Department for Environment, Food and Rural Affairs, May 2013. <https://www.gov.uk/government/publications/payments-for-ecosystem-services-pes-best-practice-guide>
 - 24 MS Reed, K Allen, A Attlee, AJ Dougill, *et al.*: 'A place-based approach to payments for ecosystem services'. *Global Environmental Change*, 2017, Vol. 43, Mar., 92-106
 - 25 N Hanley and EB Barbier: *Pricing Nature: Cost-Benefit Analysis and Environmental Policy*. Edward Elgar, 2009
 - 26 K Horwood: 'Green infrastructure: Reconciling urban green space and regional economic development: Lessons learnt from experience in England's north-west region'. *Local Environment: The International Journal of Justice & Sustainability*, 2011, Vol. 16(10), 963-75

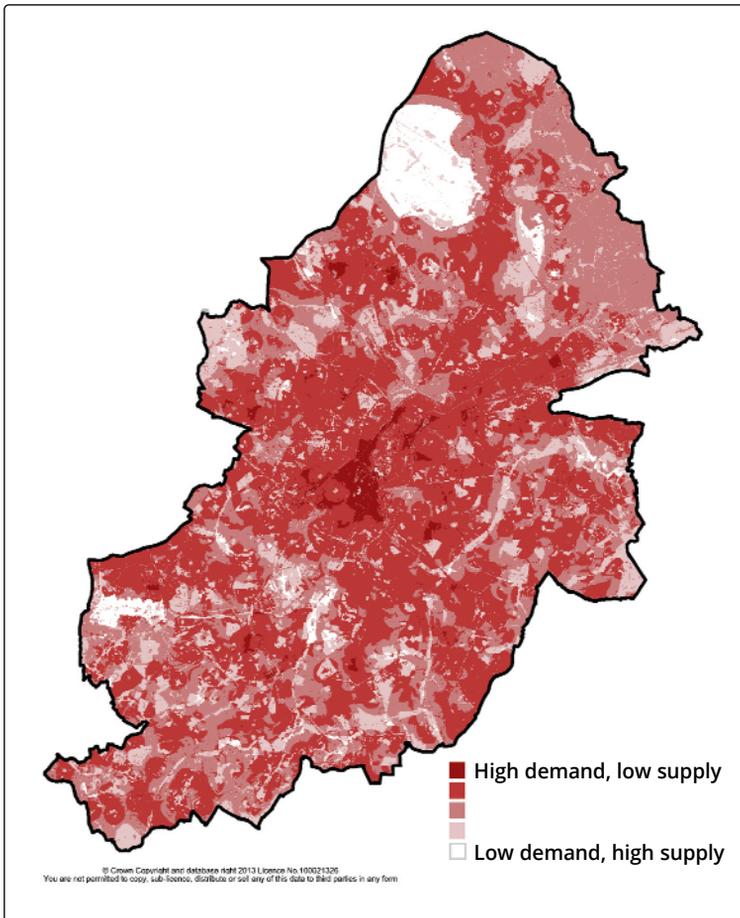


Fig. 1 Priority map for GI investment in Birmingham

Source: Birmingham City Council

Nevertheless, considerable progress has been made in natural capital accounting²⁷ and in recent revisions to the Treasury Green Book,²⁸ incorporating some costings for social and environmental benefits. A recent PERFECT project Expert Paper²⁹ has also highlighted how advances in economics and natural capital have significant potential to help transform GI so that it becomes viewed as a net asset rather than as a liability.

Birmingham City Council provides a good example of countering this tension, through the development of a composite priority map which collectively mapped six ecosystem service layers, incorporating demand and supply assessments for GI (see Fig. 1).³⁰ Crucially, the map reveals those areas in greatest need of GI investment, where demand outstripped supply. The ability to use this map at street level built significant political traction with

27 See, for example, *Principles of Natural Capital Accounting*. Office for National Statistics, Feb. 2017. <https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/principlesofnaturalcapitalaccounting>

28 *The Green Book: Appraisal and Evaluation in Central Government*. HM Treasury, Apr. 2013, updated Mar. 2019. <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government> [sic]

29 E Gianferrara and J Boshoff: *Health, Wealth and Happiness – the Multiple Benefits of Green Infrastructure*. PERFECT Expert Paper 1. PERFECT project. TCPA, Jun. 2018. https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1535017470.pdf

30 AJ Scott, C Carter, M Hardman, N Grayson and T Slaney: 'Mainstreaming ecosystem science in spatial planning practice: exploiting a hybrid opportunity space'. *Land Use Policy*, 2018, Vol. 70, Jan., 232-46

local elected representatives, as well as addressing other neglected components of GI policy affecting social and environmental justice.³¹

Despite these barriers, rather surprisingly, the European Green Infrastructure Strategy (from 2013)³² states that there is no need for legislation exclusively designed to enforce GI implementation; rather, existing legislation, policy instruments and funding mechanisms within member states are recommended for use.³³ This creates an ad hoc approach across the EU to GI policy and delivery, fuelled by a significant research deficit on the efficacy of the different planning systems as potential GI barriers, particularly at a time of economic growth prioritisation. International planning systems vary, but are all based on the legislation and regulations that define them. These legal codes differ from country to country, and therefore generate different approaches to planning policy and in the extent to which a plan-led system (as in the UK and the Netherlands) or a development-led system (as in Finland and Sweden) is in place³⁴ – and the extent to which the natural environment is prioritised outside statutory environmental designations. Our GI policy tool has been developed specifically to help assess this.

31 J Wolch, JA Byrne and JP Newell: 'Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough''. *Landscape & Urban Planning*, 2014, Vol. 125, 224-34

32 *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Green Infrastructure (GI) – Enhancing Europe's Natural Capital*. Green Infrastructure Strategy. COM(2013) 249 final. European Commission, May 2013, p.3. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0249>

33 *Ibid.*

34 Here, a plan-led system is an arrangement in which the development plan has statutory footing in the planning system and is the principal determinant for decision-making. The UK and the Netherlands have plan-led systems (see, for example, E Buitelaar, M Galle and N Sorel: 'Plan-led planning systems in development-led practices: An empirical analysis into the (lack of) institutionalisation of planning law'. *Environment & Planning A: Economy & Space*, 2011, Vol. 43(4), 928-41). A development-led system is an arrangement in which a development is assessed according to its impacts, with plans being considerations but not prime determinants (see, for example, E Valtonen, H Falkenbach and K Viitanen: 'Development-led planning practices in a plan-led planning system: empirical evidence from Finland'. *European Planning Studies*, 2017, Vol. 25(6), 1053-75)

3 Methodology

A multi-criteria analysis was used to build a GI policy assessment framework, with the focus on capturing the *multi-functional components of GI*, as opposed to the GI benefits which flow from the delivery of those functions. The framework is built in response to three previously identified GI needs:

- the need for improved *mainstreaming*;
- the need for *multi-functionality*; and
- the need for *stewardship*.

For each of these needs, evidence from the research and practice outlined earlier (i.e. Building with Nature, IGI, and the mainstreaming GI project) was used, together with contributions from planner-led workshops in the West of England Combined Authority and the UK Green Infrastructure Partnership, to co-design, develop and test assessment criteria, culminating in the A-Z assessment framework shown in Fig. 2 on the next page.³⁵

The assessment process for any plan, policy, project or programme necessarily involves the following steps:

- **Step 1:** The whole scoring process should be undertaken independently by at least two assessors and then compared, with any disparity reconciled by them collectively.
- **Step 2:** A contents analysis is undertaken, capturing relevant policy and supporting narratives, based on key-word searches on the assessment criteria terms (for example GI, green space, habitat, biodiversity, SuDS (sustainable drainage system), active travel) and other relevant proxies (for example green network, ecosystems, flooding, swales, parks).
- **Step 3:** The relevant policy and supporting text is then assessed against the assessment criteria to determine which is met in terms of the extent of coverage of that criterion (full coverage, mostly covered, some coverage).
- **Step 4:** Simultaneously, an assessment of the strength of the policy wording (i.e. the extent to which the policy and supporting text requires action) is undertaken (strong wording, medium or weak wording). This process is illustrated in Fig. 3 on page 13 and applies to scoring criteria D-Z.

For criteria A-C, a different approach is employed, based on how mainstreaming has been captured within the matrix. Here, *the environmental chapter is excluded from consideration* as GI mainstreaming is about how it has been embedded in other policy domains:

- **Step 5:** Criterion 'A' is focused primarily on the introduction, vision and strategic objective aspects of the plan which collectively create a higher-level strategic/corporate environment and/or culture for supporting investment in GI.³⁶
- **Step 6:** Criterion 'B' is subdivided into four different benefits – economic, social, health and climate – and is included where these benefits of GI are explicitly recognised within the plan. In this case each benefit is scored separately, with a composite score calculated, based on the highest score for each benefit.
- **Step 7:** Criterion 'C' is automatically calculated, based on the distribution of scores across criteria D-Z outside the environmental chapter.³⁷

35 It is important to note that the framework was co-produced by built environment professionals from the West of England Combined Authority and the Green Infrastructure Partnership

36 This clearly would not be appropriate in a green infrastructure strategy or nature conservation strategy as the environment is the sole purpose of the strategy. Thus criteria 'A-C' should be excluded

37 Both 'B' and 'C' scorings are determined by an algorithm that assesses the percentage cover, with tipping points for a grey rating at over 20%, orange at over 50% and green at over 75%

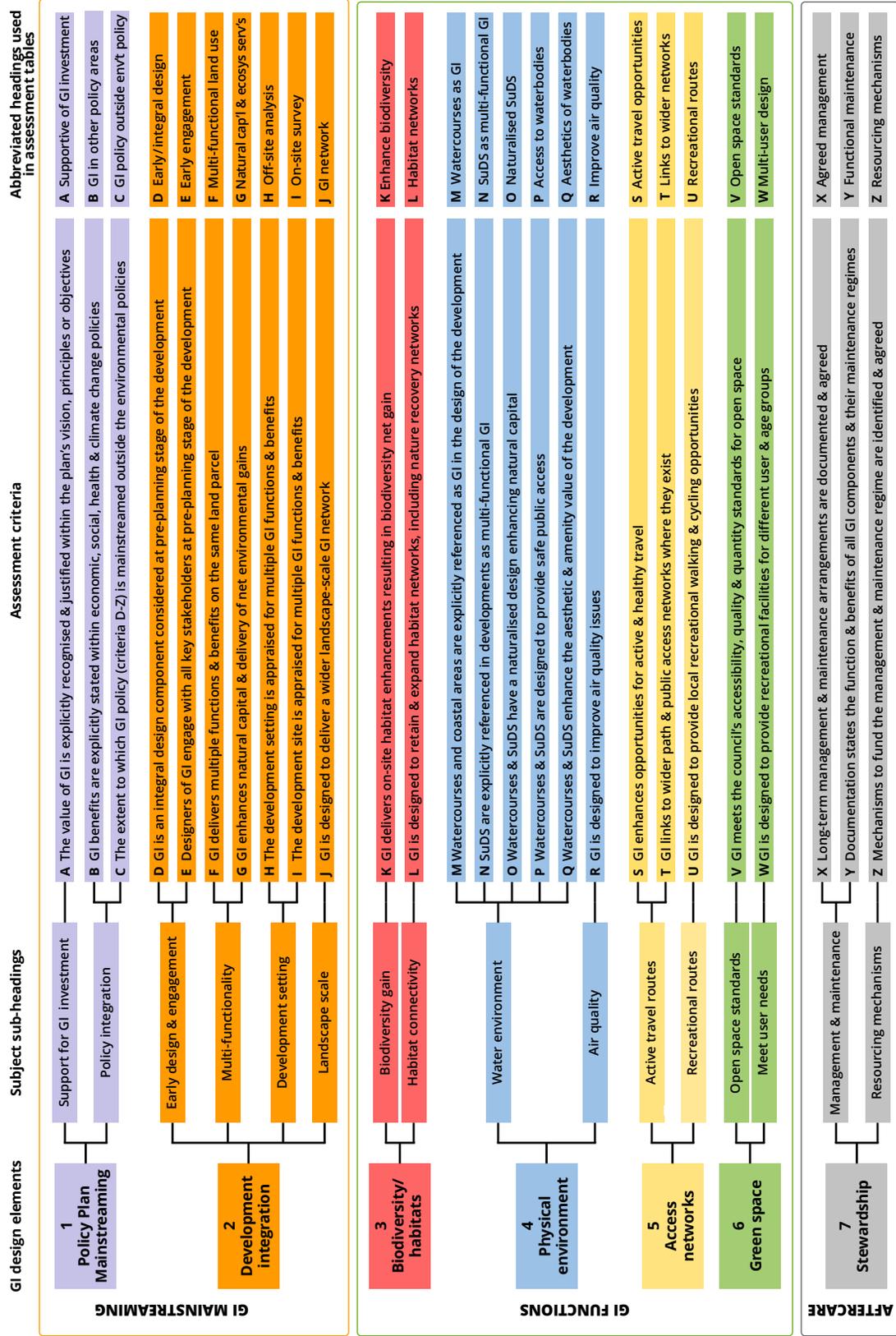


Fig. 2 A-Z GI policy assessment criteria

Table 2
Scoring approach for coverage and policy wording

Coverage of criteria	Score	Strength of policy wording	Score
Some coverage	1	Weak phrasing	1
Most coverage	2	Medium phrasing	2
Full coverage	3	Strong phrasing	3

Table 3
Example assessment of NPPF paragraphs against a GI assessment criterion

NPPF paragraph text relevant to assessment criterion K	Comment
<p><i>Policy text in bold (bold added) indicates the strength of wording</i></p> <p>'170 Planning policies and decisions should contribute to and enhance the natural and local environment by:</p> <p>a) protecting and enhancing valued landscapes, sites of biodiversity ...</p> <p>.</p> <p>.</p> <p>d) minimising impacts on and providing net gains for biodiversity ...'</p>	<ul style="list-style-type: none"> ■ Coverage score: 3 – Good coverage of 'enhancement' and 'net gain' ■ Policy wording score: 2 – 'should' weakens the policy because it can be trumped by other policies expressed as 'must', 'required' or 'expected'
<p>'174 To protect and enhance biodiversity and geodiversity, plans should:</p> <p>.</p> <p>.</p> <p>b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.'</p>	

Source: Adapted from M Hislop and A Corbett: *Green Infrastructure Policies in the CSGN: A Review of Local Authority Policies on Green Infrastructure in Built Development*. GCV Green Network Partnership, 2018, p.19. <https://mainstreaminggreeninfrastructure.com/resources.php?gi-csgn-scotland>

A simple traffic light system is used to roughly score GI coverage and policy wording, with the added proviso that the strength of policy wording cannot score higher than the GI coverage score (see Table 2).

Table 3 provides an annotated example of the scoring process used on assessment criterion K. The two concepts that are required to fully cover criterion K are that planning policies should expect *enhancement of habitats* (not just protection) and *biodiversity net gain* from development. The text relating to the strength of wording is in bold type.

Given the differences in planning systems across the EU (plan led versus development led), it is important that the context of the plan, policy, project or programme is made clear at the outset, as the differences between a plan-led versus development-led system

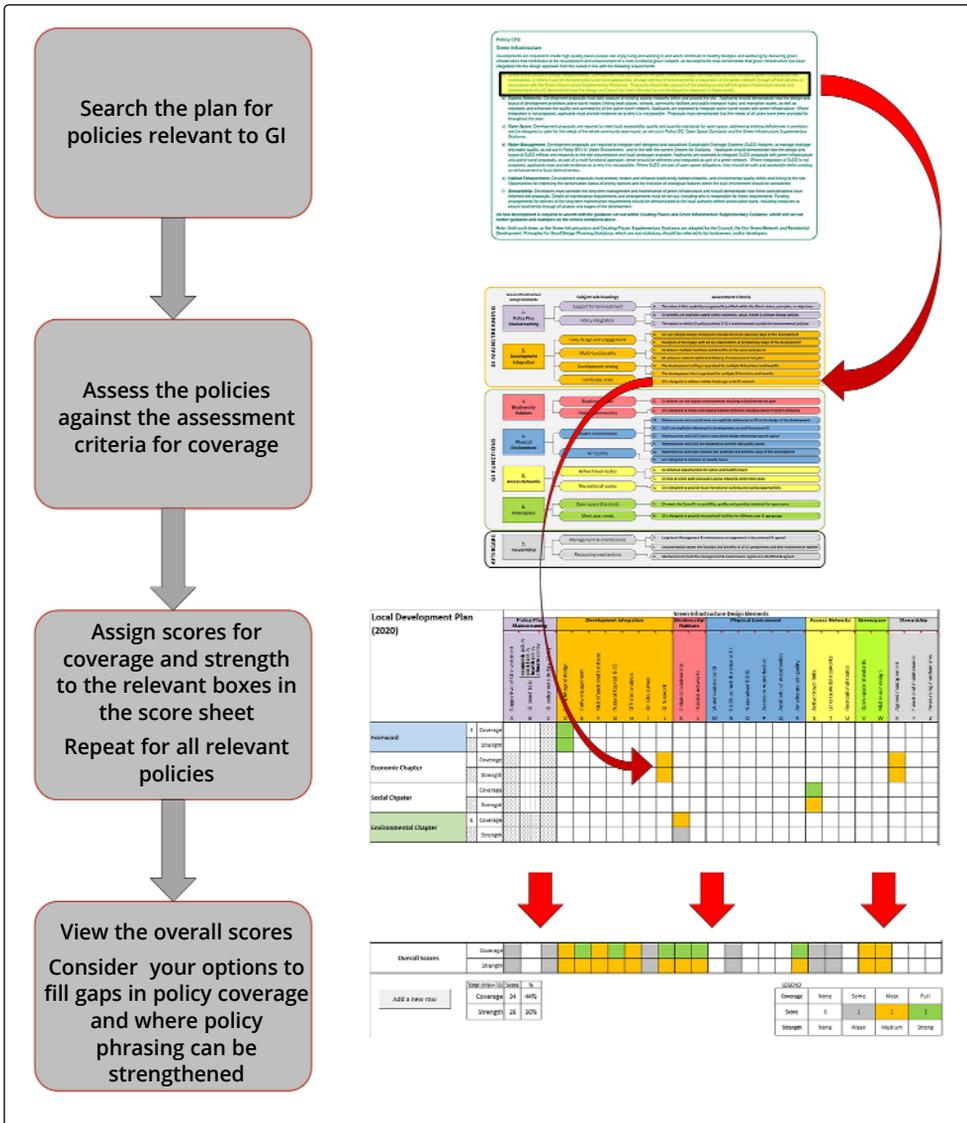


Fig. 3 Methodology - the policy assessment process

and statutory versus non-statutory plan are significant in terms of interpreting the scoring framework and devising action plans.³⁸

The method detailed above has been used for the twin assessment of the NPPF (in England) and PPW10 (in Wales), as two national planning frameworks which crucially guide the way that planning policy is prepared in development plans within local authorities/ municipalities. However, as already indicated, this method is universal and can be applied to any development or land use plan or GI strategy (excluding criteria A-C) globally, at local, regional or national scales. **The GI planning policy assessment tool is available at <https://mainstreaminggreeninfrastructure.com/project-page.php?green-infrastructure-planning-policy-assessment-tool>**

38 For example, strong policy wording in a development-led system or within a non-statutory plan will be less effective than it would be if it were part of a plan-led system in which the plan had statutory status

4 Results

Headline results

Figs 4 and 5, on pages 15 and 17, provide summary assessments for the NPPF and PPW10, respectively. At first glance, it appears that Wales is performing much better than England. However, the matrix profile is constructed from the internal structure and chapter headings of each document, which are not directly comparable. For example, the NPPF has 17 chapters while PPW10 Wales has only six. ***The key message is that each document should be assessed on its own elements and wider governance frameworks, with the results used to start/improve dialogues, highlighting areas for future GI policy development and enhancement.***

The key finding across both assessments is the ***lack of strong policy wording across the GI functions***, with only three examples in Wales and none in England. This suggests that GI policies are potentially vulnerable to being trumped by other policy priorities, such as viability and economic growth, which command significant policy weight. Context also matters here as Wales benefits considerably from having relevant environmental and health and wellbeing legislation (the Environment (Wales) Act 2016 and the Well-being of Future Generations (Wales) Act 2015), which provides supportive legal hooks to PPW10 to help strengthen GI policy and delivery. Such legislative support is conspicuously absent in England at present time.

A more positive finding is the majority coverage across GI functions (development integration, biodiversity/habitats, access networks, and green space). In particular, the biodiversity functions (GI network, natural capital, and ecosystem services) have full coverage across both frameworks. However, stewardship functions fare less well and appear to be the most problematic area for both policy frameworks. This confirms problems with GI policy taking a long-term view beyond initial establishment to include provisions for ongoing maintenance. ***So, while place-making gets significant policy attention in both documents, it is place-keeping that is suffering neglect and needs concerted policy attention.***

England – assessment of NPPF GI policy

Coverage of GI policy assessment criteria

The key result from the NPPF matrix (Fig. 4) is the lack of full GI policy coverage across the key functions, with only six criteria having full coverage.

Unsurprisingly, the chapter which provides the most coverage for GI is Chapter 15, 'Conserving and enhancing the natural environment', with six criteria covered, five of which secure full coverage. Some coverage is evident across eight other chapters (out of 17) of the NPPF, with Chapter 8, 'Promoting healthy and safe communities', and Chapter 11, 'Making effective use of land', both having five criteria covered to some extent. Meanwhile Chapter 12, 'Achieving well designed places', scores full coverage on the need for early engagement of the planning authority and the local community on design proposals and air quality. However, no other full coverage scores are encountered outside Chapter 15. Consequently, mainstreaming functions is a significant cause for concern (criteria A-C: two weak coverage scores and one absent coverage), reflecting the lack of any GI culture in the introductory core chapters and the NPPF's focus on economic growth and housing priorities.

Green infrastructure design elements

National Planning Policy Framework (July 2018)

			Supportive of GI investment		Policy plan mainstreaming	Development integration	Biodiversity/habitats	Physical environment	Access networks	Green space	Stewardship
			A	B							
Chapter 1: Introduction	Coverage										
	Strength										
Chapter 2: Achieving sustainable development	I Coverage										
	Strength										
Chapter 3: Plan-making	I Coverage										
	Strength										
Chapter 4: Decision-making	I Coverage										
	Strength										
Chapter 5: Delivering a sufficient supply of homes	Coverage										
	Strength										
Chapter 6: Building a strong, competitive economy	Coverage										
	Strength										
Chapter 7: Ensuring the vitality of town centres	Coverage										
	Strength										
Chapter 8: Promoting healthy & safe communities	Coverage										
	Strength										
Chapter 9: Promoting sustainable transport	Coverage										
	Strength										
Chapter 10: Supporting high quality communications	Coverage										
	Strength										
Chapter 11: Making effective use of land	I Coverage										
	Strength										
Chapter 12: Achieving well-designed places	Coverage										
	Strength										
Chapter 13: Protecting green belt land	Coverage										
	Strength										
Chapter 14: Climate change, flooding & coastal change	Coverage										
	Strength										
Chapter 15: Conserving & enhancing the natural environment	E Coverage										
	Strength										
Chapter 16: Conserving & enhancing the historic environment	Coverage										
	Strength										
Chapter 17: Facilitating the sustainable use of minerals	Coverage										
	Strength										
Overall scores	Coverage										
	Strength										

Total (max=78)	%
Coverage	34/44
Strength	28/36

Key:

Coverage	None	Some	Most	Full
Score	0	1	2	3
Strength	None	Weak	Medium	Strong

I: Introductory and strategic chapters
E: Environment chapter

Fig. 4 Assessment of GI policy coverage and strength of wording within the NPPF – summary



The 'Overall scores' rows reveal that six out of 26 criteria have full coverage scores in GI, but nine criteria have no coverage at all. The GI network, biodiversity and habitat networks, natural capital, early engagement and air quality criteria are fully covered while the development integration and green space criteria are mostly covered. However, the mainstreaming and access network criteria are poorly covered, and there is little if any coverage across the stewardship and physical environment (water/SuDS) functions. This overall profile of GI coverage has been likened to a Swiss cheese by Max Hislop.

Strength of policy wording

The headline result reveals the dominance of medium-strength policy wording across the policy matrix (11/26), but with none of the 26 criteria scoring strongly. The six highest-scoring GI coverage criteria are compromised by not having strong policy wording associated with them. These results collectively and individually confirm the vulnerability facing GI when confronted with other competing policy priorities.

Wales – assessment of PPW10 GI policy

Coverage of GI policy assessment criteria

The key finding reveals comprehensive coverage across all the GI functions (Fig. 5), with 14 out of 26 criteria scoring full coverage and a further four scoring most coverage. Indeed, there is only one assessment criterion that has no coverage – access to water bodies. GI mainstreaming scores well here, with all three functions having full coverage, reflecting a

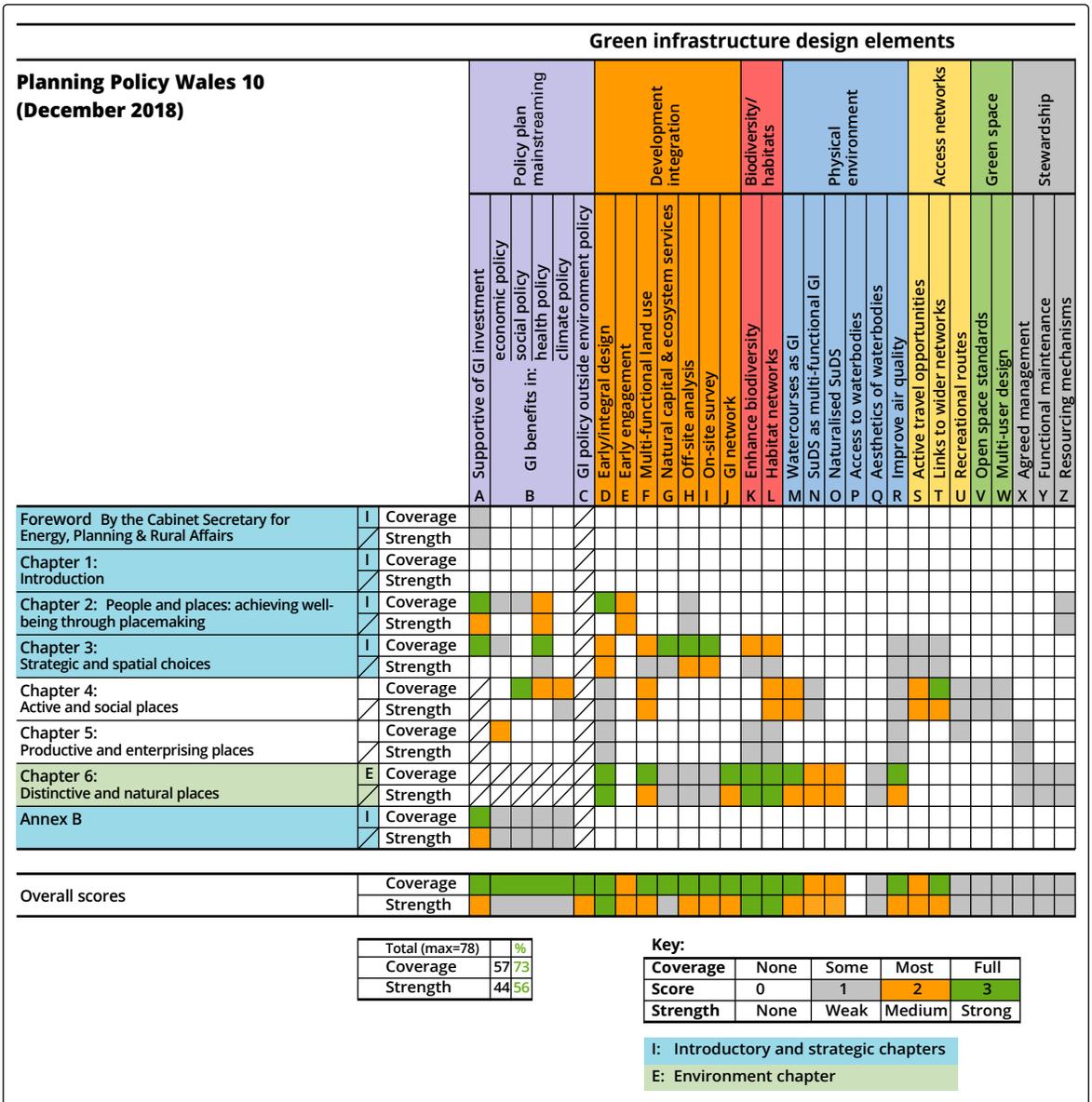


Fig. 5 Assessment of GI policy coverage and strength of wording within PPW10 – summary

more joined-up approach across the whole document, particularly with the requirement to use GI assessments in plan- and policy-making. The weakest areas of coverage relate to stewardship and green space. The stewardship function is particularly concerning, confirming the policy challenges of securing long-term investment in GI.

Strength of policy wording

The key finding is that there are only three strongly worded GI policies (early/integral design, enhancing biodiversity, and habitat networks). This confirms the inherent GI vulnerability to other policy priorities in plan-making. Nevertheless, the profile is dominated by medium-strength policy wording, with a ‘should’ requirement featuring in most cases (13 out of 26), with only the green space and stewardship functions scoring weakly.

5 Discussion and recommendations

Comparing the NPPF (England) and PPW10 (Wales) – some cautionary notes

The results reveal that GI policy across the NPPF and PPW10 overall is vulnerable to being trumped by other economic and social priorities in strategic or local development plans. While the place-making component of GI is generally acceptable, there are significant concerns over place-keeping; the policy framework for the long-term management and funding of GI.

Our comparative assessment of the NPPF (England) and PPW10 (Wales) provides some useful outcomes to consider in any policy-making or policy enhancement process.

First, it is important to understand, at the outset, how GI is positioned within the wider legislative framework. In Wales there is significant legislative support. As well as the Well-being of Future Generations (Wales) Act 2015, there is recent legislation that makes SuDS mandatory.³⁹ Furthermore, Part 1 of the Environment (Wales) Act 2016 sets out a new approach to the sustainable management of natural resources, requiring landscape-scale area statements. Collectively this framework provides a strong foundation for GI policy in PPW10 to build upon. In England there is no such legislation and, while the HM Government 25 Year Environment Plan does have significant aspirations for GI, these have yet to be captured in national planning policy responses or legislation. Furthermore, within PPW10 there is a requirement to undertake GI strategic assessments, which permeates across other policy areas, thus turbocharging mainstreaming outcomes, given its requirement in all developments – again, with no equivalent measure in England.

Second, when comparing the structure and usability of the two documents, the results are surprising. The Welsh document is long (165 pages across six chapters) and does not readily differentiate policy from the wider narrative, thus making it difficult to use and interpret. Conversely, in the English NPPF the policy is clearly differentiated and signposted with supporting text within a much shorter document (63 pages across 17 chapters). This difference matters when it is being used both as a policy and decision-making framework. This finding has not been incorporated into the matrix, but it does need to be recognised.

How to improve GI policy

Turning attention to the results of the policy assessments, important lessons are emerging on how to use the results to bring about positive change, rather than as an evaluation to simply criticise. While we have exposed legitimate concern over the gaps in GI coverage and policy wording in England's NPPF, particularly with regard to the SuDS, stewardship, and mainstreaming components, where they do occur they provide important 'hooks' (for a specific user audience) around which to position and design more effective strategic planning policies at regional and local plan scales. For those areas where there is no policy coverage, it is important to identify 'bridges' (terms or concepts with strong political traction which are easily understood across multiple publics⁴⁰) to build support across multiple publics for new policy responses.

39 On 7 January 2019, the Welsh Government introduced Schedule 3 of the Flood and Water Management Act 2010. From this date all new development of more than one building and/or where the construction area is 100 square metres or more will require a sustainable drainage system

40 AJ Scott, C Carter, M Hardman, N Grayson and T Slaney: 'Mainstreaming ecosystem science in spatial planning practice: exploiting a hybrid opportunity space'. *Land Use Policy*, 2018, Vol. 70, Jan., 232-46



Clyde Gateway, demonstrating the provision of an access network, water management, and open space

Here, the key strength of the GI policy assessment tool lies in its ability to act as a catalyst for positive dialogues and change. Designing an inclusive and deliberative participatory process that involves all relevant policy sector participants in GI discussions by using key hooks and bridges can strengthen mainstreaming narratives. We have attempted to start this process in Table 4, on pages 20-22, identifying some potential hooks and bridges across key criteria from the NPPF, set alongside those that emerge from a wider EU perspective, from which more integrated spatial planning responses can evolve to improve GI mainstreaming.

GI can make a significant contribution to the delivery of EU's main policy objectives associated with regional and rural/urban development, climate change, disaster risk management, agriculture/forestry, and the environment. This also stretches to the delivery of wider UN Sustainable Development Goals at a global level. It is this multi-functional potential for nature-based solutions that provides important bridges as institutions and governments increasingly must respond to climate, biodiversity and health emergencies.⁴¹ Such responses require strong and joined-up leadership; to take people outside their usual silos and build new pathways to policy innovation at different local, regional, national or EU scales. Here, engaging with both usual and unusual suspects (stakeholders) in inclusive and accountable partnerships is key to a successful outcome. As part of that process the hooks and bridges identified here, with suggested possible actions, offer potential starting points only. Indeed, a key role for any partnership is to identify the hooks and bridges that they see as key to plugging the policy matrix results.

Notably, within the NPPF there are four particularly important chapters that make no mention of GI at all. These gaps represent important policy opportunity spaces where, in particular, the climate emergency and concern with health and wellbeing can be used as bridges to exploit GI's credentials – as captured within Table 5, with a supporting commentary.

41 *Building a Green Infrastructure for Europe*. European Commission, 2013, p16.
<https://op.europa.eu/en/publication-detail/-/publication/738d80bb-7d10-47bc-b131-ba8110e7c2d6>

Table 4

Hooks and bridges from the NPPF and EU regulations across the policy assessment tool criteria

Strategic planning at the local scale
(hooks and bridges from NPPF text)

Strategic planning across EU member states

(hooks and bridges from EU policy and regulation)

Criteria A-C: Policy plan mainstreaming

GI promotes spatially coherent solutions to diverse and competing land management issues, while enhancing potential co-benefits. GI investments create high- and low-skilled jobs (for example in planning, engineering and building GI and restoring and maintaining urban and rural ecosystems).ⁱ

Bridges:

- Biodiversity, health and climate emergencies – UK Parliament declares a climate emergency (Nov. 2019)

Hooks:

- Dasgupta Review of the Economics of Biodiversity
- COP26 conference on climate change
These sit as macro drivers of change, with powerful political traction across English government
- To explicitly reference GI as supportive of:
 - economic objectives – for example active travel, flood and pollution amelioration (NPPF, para. 8a)
 - social objectives – for example health and wellbeing, community cohesion (NPPF, para. 8b)

Action:

To identify GI as a mandatory strategic issue crossing local authority boundaries, helping to meet the duty to co-operate function, and thus improving mainstreaming across boundaries

Bridges:

- Biodiversity, health and climate emergencies – European Parliament resolution (28 Nov. 2019) on the climate and environment emergency (2019/2930(RSP))
- COP26 conference on climate change
These sit as macro drivers of change, with powerful political traction across EU member states

Hooks:

- EU Biodiversity Strategy to 2020 – Target 2 makes clear that the EU considers green infrastructure to play an important role in protecting, conserving and enhancing the EU's natural capital
- European Spatial Development Perspective – for example Natura 2000 management plans
- SEA Directive – helps mainstream GI in sustainable development objectives

Action:

GI outside protected areas can strengthen the coherence of the Natura 2000 network by making the core areas more resilient, providing buffers against impacts on the sites

ⁱ *Building a Green Infrastructure for Europe*. European Commission, 2013. p5.
<https://op.europa.eu/en/publication-detail/-/publication/738d80bb-7d10-47bc-b131-ba8110e7c2d6>

Table 4 – Continued

Hooks and bridges from the NPPF and EU regulations across the policy assessment tool criteria

Strategic planning at the local scale
(hooks and bridges from NPPF text)

Strategic planning across EU member states
(hooks and bridges from EU policy and regulation)

Criterion D: Early/integral design

Design is a key consideration in the delivery of good spatial planning

Hooks:

- ‘Design quality should be considered throughout the evolution and assessment of individual proposals. Early discussion between applicants, the local planning authority and local community about the design and style of emerging schemes is important for clarifying expectations and reconciling local and commercial interests.’ (NPPF, para. 128)

Hooks:

- European Development Spatial Perspective. Harmonisation is needed across different infrastructure sectors. Here, there might be an opportunity to develop common standards which require GI to be considered much earlier in the planning process

Action:

- **Build on design quality via the Building Better, Building Beautiful Commission report to make explicit the need to integrate GI into all development design from the outset**
- **Use the Building with Nature standard for GI to help with design**

Action:

- **Adopt/use PERFECT Expert Paper 2 on the Green Space Factor and learning from Europe**

Criterion F: Multi-functional land use

Multi-functionality is a key component of the 2015 EU definition of GI

Bridge:

Multi-functionality (NPPF, para. 118):

- ‘Planning policies should:
 - a) encourage multiple benefits from both urban and rural land...
 - b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production’

Bridge:

Multi-functionality:

- It is increasingly recognised that GI can play an important role in disaster risk reduction. Here, fires, climate change and health and wellbeing provide bridges for GI policy action in terms of **nature-based solutions**. This has been fuelled by a significant research programme under Horizon 2020ⁱⁱ

Action:

- **To require developments to deliver multi-functional GI benefits from the same land parcel**

Action:

- **Increasing multi-functionality should be included as an objective in strategic green space plans**

ii ‘Nature-based solutions’. Environment research and innovation webpage. European Commission. <https://ec.europa.eu/research/environment/index.cfm?pg=nbs>

Table 4 – Continued

Hooks and bridges from the NPPF and EU regulations across the policy assessment tool criteria

Strategic planning at the local scale (hooks and bridges from NPPF text)	Strategic planning across EU member states (hooks and bridges from EU policy and regulation)
<p>Criterion N: SuDS as multi-functional GI</p>	
<p>Hook: Incorporation in major developments (NPPF, para. 165):</p> <ul style="list-style-type: none"> ■ 'Major developments should incorporate sustainable drainage systems... The systems used should: <ul style="list-style-type: none"> · · d) where possible, provide multifunctional benefits' <p>Action:</p> <ul style="list-style-type: none"> ■ For SuDS to be integrated as naturalised, aesthetic and accessible features within the GI of all developments <p>Drawing from experiences in Wales and Scotland, SuDS should be mandatory in all schemes</p>	<p>Hook: 2019 review of progress on the EU Green Infrastructure Strategy:ⁱⁱⁱ</p> <ul style="list-style-type: none"> ■ Natural water retention measures (NWRM) have a key role to help to slow down the flow of stormwater, increase infiltration and reduce pollution through natural processes <p>Action:</p> <ul style="list-style-type: none"> ■ Promote strategic and integrated nature-based solutions with blue infrastructure at a landscape scale
<p>Criteria X-Z: Stewardship Investing in GI brings substantial returns to the private sector. GI can be used by developers to increase land value or to protect assets from the impact of climate change, given the carbon storage, erosion and flood control services of many ecosystems^{iv}</p>	
<p>Bridges: Climate and biodiversity emergencies – tools:</p> <ul style="list-style-type: none"> ■ Payment for ecosystem service schemes such as moorland re-wetting ■ Community Infrastructure Levy Section 123 infrastructure lists ■ Net environmental and biodiversity gains <p>Action:</p> <ul style="list-style-type: none"> ■ Use the bridges to secure political traction to then use the key tools 	<p>Bridges: Climate and biodiversity emergencies – tools:</p> <ul style="list-style-type: none"> ■ Payment for ecosystem service schemes such as moorland re-wetting ■ Betterment and compensation tools <p>Action:</p> <ul style="list-style-type: none"> ■ Use the bridges to secure political traction to then use the key tools

iii *Review of Progress on Implementation of the EU Green Infrastructure Strategy*. Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2019) 236 final. European Commission, May 2019. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019DC0236&qid=1562053537296&from=EN>

iv *Review of Progress on Implementation of the EU Green Infrastructure Strategy*. Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2019) 236 final. European Commission, May 2019. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019DC0236&qid=1562053537296&from=EN>

Table 5
NPPF opportunity 'bridges' for improved GI mainstreaming

NPPF chapter	Opportunity (recommendation)
5 - 'Delivering a sufficient supply of homes'	Could incorporate new policy tools, such as Building with Nature, to help raise the standards of GI in housing developments, creating a link between GI and the economy.
6 - 'Building a strong, competitive economy'	Can focus on the climate emergency policy hook to help develop a stronger green economy sector that can take advantage of nature-based solutions, with GI at the forefront of delivery.
7 - 'Ensuring the vitality of town centres'	Can draw on research and policy that shows how green and blue infrastructure can help transform and revitalise town centres, providing exciting and attractive public realm settings within which people can meet and socialise, and where consumer-led businesses and café culture can operate.
13 - 'Protecting green belt land'	Deals with Green Belt while making no mention of the fact that where Green Belt exists it forms a core component of the GI network. Thus currently GI is dis-integrated from Green Belt policy, and there is an opportunity to look, in particular, at how they can be fused to help with the climate emergency and health and wellbeing goals that are key bridges to help wider GI mainstreaming.

Mainstreaming breadth and depth

When it comes to the mainstreaming of GI policy it is really important that there is breadth as well as depth of policies – that they provide full coverage of the criteria (depth) and are embedded across thematic chapters (breadth), and not just isolated in the 'natural environment' chapter. There are inherent dangers in trying to design an all-encompassing GI policy in one chapter alone without sufficient connections across other policy chapters, and GI policy also needs to connect with wider natural capital, ecosystem services and net gain concepts. This is challenging as the linkages between these different terms and concepts are not well understood, given that they were introduced at different times and for different purposes – although recent work has tried to address this.⁴²

In addition, the work of Hislop *et al.*⁴³ in Scotland, using an earlier version of the GI policy assessment tool on 19 local plans, allowed model policies to be designed from the highest-scoring policies they encountered (see Fig. 6). These policies are there to be adapted to specific contexts, supported by a relevant evidence base, and certainly should not reside within the 'Natural environment' chapters of policy guidance. For example, in NPPF the GI functions policies are perhaps better located in the 'Climate change and flooding', 'Healthy

42 'Understanding our growing environmental vocabulary in England connecting green infrastructure, natural capital, ecosystem services and net gains within the English planning system'. Webpage. Mainstreaming Green Infrastructure project. <https://mainstreaminggreeninfrastructure.com/project-page.php?understanding-our-growing-environmental-vocabulary-in-england>

43 M Hislop, AJ Scott and A Corbett: 'What does good green infrastructure planning policy look like? Developing and testing a policy assessment tool within Central Scotland'. *Planning Theory & Practice*, 2019, Vol. 20(5), 633-55

Green infrastructure primary policy	
Green infrastructure is integral to place-making underpinned by the qualities of successful places, and therefore must be part of the design process from the outset, proving water management, access networks, habitat enhancements and open space functions .	
To achieve this, developments are expected to: <ul style="list-style-type: none"> ● discuss what green infrastructure is appropriate for the site at pre-application meetings with the planning authority and relevant stakeholders; ● appraise the site context for green infrastructure functions, undertake habitat and hydrological assessments of the site as requested through pre-application discussions, and demonstrate how they have influenced the design; and ● take opportunities to achieve multi-functionality by bringing green infrastructure functions together. 	
Green infrastructure functions	
Water management	Access networks
Development proposals will integrate naturalised SuDS features into the design of green infrastructure, and where they are part of open space obligations will be safe and accessible, creating an attractive and distinctive setting for new developments.	Development proposals will maintain and enhance the quality and connectivity of access networks, integrating active travel routes (linking workplaces, schools, community facilities and public transport hubs) and recreation routes into green infrastructure.
Habitat enhancements	Open space
Development proposals will conserve and enhance on-site biodiversity and habitat networks within and adjacent to the site.	Development proposals will meet local accessibility, quality and quantity standards for open space, and will be designed to cater for the needs of the community.
Stewardship of green infrastructure	
Developers will provide details of the green infrastructure functions and maintenance requirements, and the party responsible for them, and demonstrate funding arrangements for their long-term delivery to the satisfaction of the local authority before construction starts.	

Fig. 6 A suite of ‘exemplar’ GI policies derived from the highest-scoring policies identified in the Central Scotland local authority GI policy review

Source: Adapted from M Hislop and A Corbett: *Green Infrastructure Policies in the CSGN: A Review of Local Authority Policies on Green Infrastructure in Built Development*. GCV Green Network Partnership, 2018, p.55.

<https://mainstreaminggreeninfrastructure.com/resources.php?gi-csgn-scotland>

communities’, ‘Sustainable transport’ and ‘Well-designed places’ chapters. One model policy that is crucial to both the NPPF and PPW10 results concerns stewardship functions, which go beyond ideas of place-making to embrace place-keeping.⁴⁴ This is a key problem in GI literature, and is evidenced in the relatively weak responses at national level here.

44 N Dempsey, H Smith and M Burton: *Place-Keeping: Open Space Management in Practice*. Routledge, 2014

6 Conclusions

This Expert Paper has detailed the challenges facing GI in policy and practice and, in response to the barriers identified, has shown how the co-development of a policy assessment tool can be used to assess how good green infrastructure policy is, using English and Welsh national planning guidance as examples. However, the tool can be used at a range of scales to help revise extant plan policies or develop new strategic or neighbourhood-level plans. Crucially, it is a process-driven tool that enables participants to discuss how to address any identified weaknesses, using hooks and bridges to improve mainstreaming processes, and to help strengthen the use and adoption of nature-based solutions to many of our key urban and rural challenges.

Our findings reveal that overall national GI policy is vulnerable, given its relatively weak policy wording. There are also weaknesses in GI policy addressing long-term stewardship functions, with an urgent need for better mainstreaming. In England there is a notable lack of policy coverage for sustainable urban drainage systems. From interrogating the results from the use of the GI policy tool we make suggestions on how the weaknesses and gaps in GI policy might be addressed, to help improve the NPPF and PPW10 – and we also offer wider recommendations for partners across the EU and elsewhere. Ultimately, this is about facilitating improved understanding and dialogues about GI potential among planning policy-makers and developers and wider publics who can all benefit from its improved integration as a critical part of spatial planning processes.

PERFECT

a European partnership...

The PERFECT project will demonstrate how the multiple uses of green infrastructure can provide social, economic and environmental benefits; and it will raise awareness of this potential, to influence the policy-making process and to encourage greater investment in green infrastructure.

PERFECT aims to:

- spread awareness of the value of green infrastructure for the jobs and growth agenda among a wider audience;
- identify transferable good practice;
- improve investment and stewardship by engaging managing authorities and increasing the professional capacity of key stakeholders in delivering new projects; and
- help make places more economically, socially and environmentally viable by developing action plans to take advantage of the multiple benefits of strategic investment in green infrastructure.

The PERFECT project will work to identify the multiple benefits of green infrastructure investment through EU Structural Funds Operational Programmes and other policy instruments, in order to help formulate holistic and integrated approaches to the protection and development of the natural heritage.

The PERFECT partners are: Provincial Government of Styria, Department for Environment and Spatial Planning (Austria); Social Ascention of Somogy Development, Communication and Education Nonprofit Ltd (Hungary); Municipality of Ferrara (Italy); City of Amsterdam (Netherlands); Bratislava Karlova Ves Municipality (Slovakia); Regional Development Agency of the Ljubljana Urban Region (Slovenia); Cornwall Council (UK); the Town and Country Planning Association (UK).

