Urban Greening Factor for England – Summary Report

Green Infrastructure Framework – Principles and Standards for England

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A list of the GI Framework Advisory Group members is provided in Appendix 1.

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Executive Summary

There is a clear and urgent need to make our urban environments greener, healthier and more attractive places to live. The 25 Year Environment Plan placed particular emphasis on the importance of greening our towns and cities with an aim to improve existing green infrastructure, encouraging more investment in the environment and supporting more sustainable forms of development. This aim is at the heart of Natural England's Green Infrastructure Framework - Principles and Standards for England (Green Infrastructure Framework) that provides the planning tools to create more biodiverse and resilient urban districts and neighbourhoods as the impact of climate change becomes increasingly evident.

Our planning system already recognises the importance of urban greening as an essential component of sustainable development. Planning policy provides guidance at a national and local level to improve the provision of green infrastructure and better target investment where it is needed the most. To strengthen this approach, Urban Greening Factors (UGF) are increasingly being used as a planning tool to improve green infrastructure delivery through the process of development and regeneration. They were first developed in Northern Europe in the late 1990s. First by Berlin to combat the growing densification of urban neighbourhoods and then through the experimental and creative planning of Malmö's Western Harbour in Sweden. Urban Greening Factors have since been adopted by cities in Europe, Asia, North America and Australia. They are increasingly being used in the UK by Local Planning Authorities in the revision of their local plans and have become a prominent policy tool for urban greening across Greater London through the adopted London Plan.

This Summary Report provides an overview of the research commissioned by Natural England and Defra to inform the development of the Model Urban Greening Factor for England. It summarises the early development and evolution of the Urban Greening Factor and how it is now applied through planning policy and practice. This process of application is illustrated through a set of five current case studies: Southampton City Council, London Borough of Sutton, City of London, Greater London Authority, and Swansea Council.

The Report introduces the structure and content of a Model Urban Greening factor for England and its role within the Green Infrastructure Framework. There are two main components of the UGF:

(a) a target factor score that sets a minimum proportion or percentage of greening for a particular site, area or land use; and,

(b) a schedule of weighted surface cover types that are used to calculate the score.

The UGF score is calculated by multiplying the area of each surface cover type by its weighting; each figure is then added together and divided by the total area within the development site boundary that is commonly referred to the red-line boundary.

$$\text{Urban Greening Factor Score} = \frac{\text{Sum of each Surface Area type } (m^2)\ (\text{Surface Area A} \times \text{Factor A} + \text{Surface Area B} \times \text{Factor B} + \text{Surface Area C} \times \text{Factor C, etc.})}{\text{Total site area } (m^2)}$$

The resulting score is then compared with the target UGF score for the development site set by the planning policy and the score indicates whether the urban greening proposals achieve, exceed, or fail to meet the defined target score.

Proposals for a Model UGF Standard for England include both target scores for specific land uses and a set of weighted surface cover types. These have been developed from detailed research on international UGF applications following their initial development in Europe to current UK planning policy and practice.

The Model UGF is one of five Headline Green Infrastructure Standards within the Green Infrastructure Framework. The Headline Standards are supported by a wider Menu of Green Infrastructure Standards, which include carefully selected standards, tools, guidance and best practice checklists. The use of the UGF planning tool should be aligned with the Principles and other components of the Green Infrastructure Framework, which comprises:

- **Green Infrastructure Principles:** the what, why and how of good green infrastructure.
- **Green Infrastructure Standards:** guidance on national standards for green infrastructure quantity and quality.
- **Green Infrastructure Maps:** mapped environmental and socio-economic datasets to support the standards.
- **Green Infrastructure Planning and Design Guide:** practical, evidence-based advice on how to design good quality green infrastructure.
- **Green Infrastructure Process Journeys:** guides on how to apply all the products in the Green Infrastructure Framework.

The Report concludes by setting out the benefits of the use of the UGF for England, for the delivery of green infrastructure through the development planning process.

1.0 Introduction and Summary

1.1 Natural England has developed an Urban Greening Factor for England, as one of a suite of five Headline Green Infrastructure Standards within the Green Infrastructure Framework – Principles and Standards for England. This Report summarises the research that has been undertaken to develop the Urban Greening Factor (UGF) for England. A User Guide for the Urban Greening Factor for England describes its purpose, structure, and content. It explains how it can be used to increase urban greening, including the contribution it can make to Biodiversity Net Gain. The User Guide is accompanied by a User Guide Spreadsheet that can support stakeholders in calculating Urban Greening Factor scores. Further information about the development of the Model Urban Greening Factor for England is provided in Appendix 2, and is available on the Green Infrastructure Framework website.

1.2 This report provides a brief summary of the evolution and growth of UGFs, from initial development in Berlin and Malmö to an international planning tool that has been adopted across Europe, North America and as far as Singapore and Melbourne. The primary objective of the UGF is to accelerate urban greening and improve the provision of green infrastructure in urban areas. The strength of UGF as a planning tool lies in its simplicity in setting target factors for specific land uses and locations and a menu of surface cover types that are weighted according to their functionality and ability to deliver ecosystem services for environmental and social benefit.

1.3 As a planning tool, UGFs can be integrated in wider planning policies and objectives and are increasingly being included in Spatial Strategies and Local Plans. The 25 Year Environment Plan, (DEFRA, 2018) is clear in the need 'to improve existing green infrastructure by encouraging more investment while making sure there is a presumption for sustainable development'. UGFs provide a mechanism to green increasingly dense urban districts, promote environmental and biodiversity net gain, mitigate the impact of climate change and improve the resilience of urban communities. This report and accompanying papers explain in technical detail how this can be achieved, how factors can be set and calculated and where they should be incorporated in the planning and development process.

2.0 Development of Urban Greening Factors

2.1 Urban Greening Factors or Green Space Factors were first established as a planning and development tool in Berlin and then Malmö during the mid to late 1990s. They have since been adopted by cities in Asia, Europe, the United States, Canada, and Australia. Southampton was the first location in the UK to use a Green Space Factor for the city centre in 2015. The Urban Greening Factor is now included as a green infrastructure policy tool in the adopted London Plan (GLA,

2021) and is increasingly being included by London Boroughs in the revision of their local plans. The term Urban Greening is adopted to emphasise the tool's role in providing site-based green infrastructure through the development process, in addition to the provision of public parks and public open space networks that are delivered through other associated planning policies.

2.2 Below lists the chronological development of UGFs and indicates that whilst this approach was first explored in the UK in 2008 by the Northwest Development Agency its use has expanded more rapidly during the past five years.

Chronological development of Urban Greening Factors

- **1994 - Berlin, Germany**, develops Biotopflächenfaktor (BFF) for greening urban neighbourhoods
- **1997 - Warsaw, Poland**, introduces Ratio of Biologically Vital Area (RBVA) for landscape protection
- **2001 - Malmö, Sweden**, develops Grönytefaktor (GYF) as part of the planning for the Bo01 Expo
- **2002 - Singapore**, introduces Green Plot Ratio (GnPR) to measure urban vegetation cover
- **2004 - Paris, France,** introduces the Coefficient de biotope (CBS)
- **2006 - Seattle, USA**, first city in the United States to adopt an UGF, the Seattle Green Factor (SGF)
- **2006 - Toronto, Canada**, introduces discretionary Toronto Green Standard (TGS) for new development
- **2008 - Northwest England**, NWDA develops a Green Infrastructure Score for new developments
- **2010 - Helsinki, Finland,** Green Factor Method developed through Climate Proof City programme
- **2013 - Washington DC, USA**, introduces a Green Area Ratio (GAR) system for building applications
- **2014 - Stockholm, Sweden** introduces a Grönytefaktor for the Royal Urban Seaport development
- **2015 - Southampton, England**, the first UK authority to develop a Green Space Factor (GSF) as part of the City Centre Area Action Plan
- **2018 - London Borough of Sutton, England,** adopts a Green Space Factor through Local Plan Policy 33
- **2018 - London Borough of Islington, England**, incorporates Greater London Authority (GLA) defined Urban Greening Factor in Local Plan
- **2018 - City of London, England,** included Urban Greening Factor in Draft City Plan 2036 under Policy OS2
- **2019 - London, England**, GLA includes Urban Greening Factor in new London Plan, Policy G5 Urban Greening introduced proposals for an Urban Greening Factor

- **2019 - Swansea City and County Central Area** GI Strategy include proposals for Green Space Factor

International UGF Development

2.3 The development of the first UGF model in Berlin was followed by Malmö, Singapore and Paris before applications became more widespread in several North American cities. Most recently it has been introduced as a Green Factor tool in Melbourne, Australia. Whilst each approach varies in content with factors set to meet particular local objectives the models follow similar principles established by Berlin. Nine international models listed in below have been described in detail during Stage 2 of the GI Framework - See Paper 2.1 / Review of UGF Applications (Appendix 2).

List of International Urban Greening Factors reviewed during Stage 2 development of the Green Infrastructure Framework:

1. Berlin, Biotope Area Factor
2. Malmö, Green Space Factor
3. Singapore, Green Plot Ratio
4. Paris, Biotope coefficient
5. Seattle, Green Factor
6. Toronto, Green Standard
7. Helsinki, Green Factor Method
8. Washington DC, Green Area Ratio
9. Stockholm, Green Space Index

UK UGF Development

2.4 Application in the UK was initially led by learning from the EU-funded GRaBS (2008-11) and PERFECT (2017-2021) programs and these have steadily expanded over the past five years. Six UGF models listed below have been described in detail during Stage 2 of the GI Framework - See Paper 2.1 / Review of UGF Applications (Appendix 2).

List of UK Urban Greening Factors Reviewed during Stage 2 of the Green Infrastructure Framework:

1. Southampton City Council - Green Space Factor
2. City of London - Urban Greening Factor
3. London Borough of Sutton - Green Space Factor
4. City of Portsmouth - Urban Greening Factor
5. Greater London Authority - Urban Greening Factor
6. Swansea - Green Space Factor Tool

2.5 Additional local authorities and development corporations are starting to establish their own UGFs with reference to familiar European models and the Greater London Authority (GLA) London Plan UGF Policy. For example, the London Borough of Islington draft Local Plan now requires developments to provide GI in accordance with the standard set out by the GLA UGF Policy as described in a Local Plan Topic paper on Green Infrastructure. The London Legacy Development Corporation and the Old Oak and Park Royal Development Corporation are also developing UGF and Green Points Systems to increase green cover and net gain in biodiversity

3.0 Policy and Planning Context

3.1 UGFs have been developed as a planning tool to improve the provision of green infrastructure and increase the level of greening in urban environments. It can be introduced through planning strategies and policies as a practical response to rising urban density, declining biodiversity and the growing impact of climate change. It provides a mechanism to improve the resilience and sustainability of urban districts by increasing ecosystem service provision.

25 Year Environment Plan

3.2 It is essential that urban areas protect, enhance and increase their green spaces, natural habitats, biodiversity and networks of green infrastructure. The 25 Year Environment Plan (DEFRA, 2018, p77) includes a particular focus on greening towns and cities with the need to provide more and better quality green infrastructure by accelerating the level of investment. The Plan also introduces the principle of environmental net gain for 'development, including housing and infrastructure'. It seeks to 'establish strategic, flexible and locally tailored approaches that recognise the relationship between the quality of the environment and development' to achieve 'measurable improvements'. Tried and tested UGF applications offer a variety of examples on how such measurable improvements can be achieved through planning policy and delivery.

Climate Change Resilience

3.3 UGFs have been developed as a planning tool to improve functionality and by application provide a variety of specific ecosystem services to improve the environmental performance of places. UGF policies can be introduced through planning strategies and guidance as a practical response the growing impact of climate change and to improve the resilience and sustainability of urban districts. This can be achieved by improving surface water management, better air quality regulation and greater carbon sequestration, allowing the natural environment and

nature-based solutions to play a more active role in the planning, design and management of neighbourhoods, towns and cities.

3.4 The City of Malmö in Sweden first used an UGF to improve ecosystems and their functionality by increasing their quality, quantity and infiltration in natural areas (Think Nature, 2018). This included creating areas for stormwater storage, improved carbon sequestration and the provision of socio-cultural activities. The London Borough of Sutton introduced a Green Space Factor through Policy 33: Climate Change Adaptation in its Local Plan (LB Sutton, 2018, p114). This seeks to minimise overheating and improve surface water drainage by increasing blue and green spaces, incorporating a range of natural cooling and drainage measures.

Biodiversity and Environmental Net Gain

3.5 The Environment Act (2021) now mandates a minimum 10% net gain in biodiversity and UGF policies should be seen as a means to meeting, if not exceeding, this requirement. The Biodiversity Metric 3.1 (Natural England, 2021a) uses a habitat-based approach to determining a proxy biodiversity value and should be used by planners, developers and ecologists to calculate net gain in biodiversity. In urban locations it is not uncommon for brownfield development sites to have a low biodiversity baseline level where subsequent net gains for biodiversity, including the mandatory 10% net gain, may be relatively modest. In these circumstances local planning polices for biodiversity should promote an ecologically informed approach to design and development to improve on the biodiversity baseline. This can be strengthened with the use of UGF policies that define specific urban greening objectives for locations and land uses. Furthermore, planning authorities may also choose to publish Supplementary Planning Guidance or Design Guides that reflect local contexts and priorities. For example, the Greater London Authority has jointly published an Urban Greening for Biodiversity Net Gain Design Guide with the London Wildlife Trust (GLA, 2021).

Public Health and Wellbeing

3.6 There is strong and compelling evidence of the positive impact green and nature-rich environments have on the health and wellbeing of communities. Public Health England (2020) considers that 'local green (and blue) space to be critical assets for maintaining and supporting health and wellbeing in local communities'. Planning strategies and policies are increasingly including a focus on public health, for example the Parks for Health Strategy, prepared jointly by Camden and Islington, and the London Plan Healthy Streets Policy (GLA, 2021, Policy T2, p402). Improved quality of life and significant annual savings in health costs can be gained through better access to greenspace and these savings may be higher when both health and environmental inequalities are taken into account. UGF provide a mechanism to target investment in green infrastructure where it is needed the most.

3.7 Stockholm has adapted and refined Malmö's Green Space Factor for significant areas of development in the city and the Green Space Index (GSI) is now a compulsory planning tool in the redevelopment of the former industrial land of the Royal Urban Seaport. The development project publishes annual Sustainability Reports that include a performance indicator on how the GSI utilises 'ecosystem services to build a resilient and healthy urban environment'. The Local Plan of London Legacy Development Corporation (LLDC, 2020) includes Strategic Policy to create 'a sustainable and healthy place to live and work' (SP.5). This uses an UGF to provide appropriate, high-quality and well-maintained urban greening, as a fundamental element of site and building design. It measures performance by the number of planning approvals granted for development schemes that successfully meet or exceed the UGF target.

National Planning Practice

3.8 Green and Blue Infrastructure can make a significant contribution to delivering sustainable development which is the primary objective of the planning system. When strategically planned, designed and managed green infrastructure can significantly improve the quality and amenity of urban areas, providing the means to deliver a variety of ecosystem services that deliver a variety of social, environmental and economic benefits and returns. These are considered to be essential outcomes of the planning system and key ingredients of healthy, attractive, thriving and prosperous places.

3.9 The National Planning Policy Framework (DLUHC, 2021a, p67) defines green infrastructure as a collective term that includes both green and blue elements. Planning policies 'should be based on robust and up-to-date assessments of the need for open space, sport and recreation facilities' (NPPF, 2021, para 98) and should enhance the natural and local environment by 'minimising environmental impacts on and providing net gains for biodiversity' (NPPF, 2021, para 174e). Planning Practice Guidance for the Natural Environment (DLUHC, 2019) provides a number of planning objectives for green infrastructure and demonstrates how strategic and proactive environmental planning can contribute to:

- Building a strong, competitive economy
- Achieving well-designed places
- Promoting healthy and safe communities
- Mitigating and adapting to climate change, flooding and coastal change
- Conserving and enhancing the natural environment

3.10 UGFs provide a practical and simple to use planning tool to achieve many objectives of the National Planning Framework and Planning Practice Guidance and can also contribute to delivering the aims of the National Design Guide (NDG; DLUHC, 2021b). This sets priorities for creating beautiful, enduring and successful places and UGFs provide a mechanism to promote and measure the provision of

nature-rich landscapes (NDG Characteristics N1-N3) and public spaces (NDG Characteristics P1-P3). The use of UGF can also be aligned with the National Model Design Code (DLUHC, 2021c) providing a means to promote, measure and monitor the delivery of the Nature and Public Space components of the code. Where an UGF policy is in place, design proposals for green infrastructure should demonstrate how they meet UGF policy and target scores as part of a planning submission which can then be secured through subsequent planning permissions and agreements.

4.0 Current Urban Greening Factor Practice and Case Studies

4.1 The early testing and implementation of UGF policies was led by Southampton City Council in 2015 and the London Borough of Sutton in 2018 and followed EU-funded urban greening research programmes. The application of UGFs has steadily expanded over the past five years with a particular focus on Greater London and London Boroughs. The adopted UGF policy in the London Plan (GLA, 2021) followed a preliminary research report (Grant, 2017) and stakeholder consultation.

4.2 A detailed chronology of the development of UGF in the UK is provided below. This indicates that in addition to Southampton and London, Portsmouth and Swansea have also adopted policies and Greater Manchester is currently exploring proposals for a Green Factor than can be used across councils within the Combined Authority through the Joint Development Plan.

Chronological development of Urban Greening Factors in the UK:

- **2015 Southampton City Council** - Green Space Factor included in City Centre Area Action Plan, adopted in March 2015
- **2017 Greater London** Authority - Urban Greening Factor first included consultation on the draft New London Plan, Policy G5 Urban Greening, Draft for public Consultation, December 2017
- **2018 London Borough of Sutton** - Green Space Factor included in Local Plan Policy 33, February 2018 and Technical Guidance Note, April 2018
- **2018 City of London** - Urban Greening Factor included in the draft City Plan 2036 under Policy OS2, Proposed Submission Draft, November 2018
- **2018 London Borough of Islington -** Urban Greening Factor included in Policy G1 of the Development Management Policies, Regulation 18 Draft, November 2018
- **2019 Portsmouth City Council** - Urban Greening Factor introduced in Green Infrastructure Background Paper, February 2019
- **2019 London Borough of Hounslow** - Urban Greening Factor introduced in West of Borough Local Plan Review, Volume 3 Pre-Submission Consultation, July 2019

- **2019 Swansea City Council** - Green Space Factor introduced in the Central Area Green Infrastructure Strategy, Consultation Draft, August 2019
- **2020 London Borough of Hackney** - Urban Greening Factor included in Policy LP48 of the Hackney Local Plan 2033 Strategic Planning, adopted in July 2020
- **2020 London Borough of Waltham Forest -** Urban Greening Factor introduced by reference to London Plan Policy G5 in the Local Plan 2020 -2035, Regulation 19, October 2020
- **2021 Greater Manchester -** Proposals to develop a Green Factor included in Policy JP-G8 of the Joint Development Plan Document, Publication Stage, August 2021

4.3 To review the effectiveness of current UGF planning practice five case studies have been prepared for Southampton, Sutton, The City of London, Greater London, and Swansea City that included structured interviews with the planning teams. The selection took account of the chronological development of UGFs, their application at different planning scales and through the use of different tools. For example, Southampton applies a Green Space Factor through a City Centre Area Action Plan; The City of London applies an Urban Greening Factor through the draft Local Plan (City Plan); and Swansea applies a Green Space Factor within a Green Infrastructure Strategy for its Central Area. The full Case Studies were completed during the final Stage 3 of the GI Standards Framework; see Urban Greening Factor- Case Studies (Neal, 2023).

Southampton City Council

4.4 Southampton City Council (SCC) developed and adopted a Green Space Factor (GSF) following both European good practice and supporting research and analysis undertaken by the University of Southampton. The GSF is a requirement for all planning submissions within the city centre through the City Centre Action Plan (CCAP) which was adopted in 2015. Its application is described in CCAP Policy AP12 Green Infrastructure and Open Space and the process for using the GSF tool is set out in a companion guide - Green Space Factor Guidance Notes (2015).

4.5 SCC commissioned a Green Space Factor Tool Report (2012) that provided a more detailed appraisal of the GSF including a quantitative system that allocated scores to different surface types reflecting how many GI benefits they deliver. This was based on modified versions of the Berlin Biotope Area Factor, the Malmö Green Space Factor and work undertaken by the Northwest Development Agency. SCC also prepared an Open Space and Green Infrastructure Background Paper (SCC, 2013) that provided an additional assessment of the benefits of a GSF tool and a technical analysis of existing GSF scores for Lower Super Output Areas across the city. This demonstrated that the city centre, central and waterfront areas have a much lower provision of green infrastructure and how the GSF policy could be used to target and measure quantitative and qualitative improvements in green infrastructure across the city centre.

London Borough of Sutton

4.6 The London Borough of Sutton was the first council in London to adopt a Green Space Factor (GSF) through Local Plan policy. This was also a direct outcome from the European funded GRaBS programme and evolved through discussion and collaboration with Southampton City Council, which was a joint partner in the programme. A key driver for the GSF has been the need to adopt practical planning measures to adapt and mitigate the impact of climate change.

4.7 The Local Plan (2016-2031) adopted in 2018 has a particular focus on improving environmental performance and resilience and included three measures to assess and mitigate the environmental impact of new development. A Carbon Offset Fund, a Biodiversity Calculator, and the Green Space Factor were introduced through Policy 33: Climate Change Adaptation that was included to tackle the Urban Heat Island Effect, minimise overheating, improve surface water drainage and increase biodiversity. The Local Plan policy emphasises the importance of green infrastructure to facilitate urban cooling through the specific use of green roofs and tree planting. This includes a requirement that 'all residential and major non-residential developments on previously developed sites should aim to achieve at least a 10% increase in green coverage, particularly in built-up areas deficient in open space'.

The City of London

4.8 Proposals for establishing a UGF for the City of London was informed by an Urban Greening Factor Study (Grant, 2018) research paper that included similar content to the research paper for the London Plan. A subsequent Planning and Transportation Committee paper on Green Initiatives in the City (CoL, 2018) provided information and a set of recommendations from the UGF study to deliver additional greening across the city. It explained the rationale behind the UGF and how it could be used to increase green infrastructure investment through the emerging Local Plan (CoL, 2021) and the London Plan (GLA, 2021).

4.9 The UGF is now included in Policy OS2 of the draft City of London Local Plan and applied within the Local Plan Boundary. The wording of the Policy follows the recommendation in the UGF study that 'the draft London Plan target of 0.3 would be a challenging and appropriate target for both commercial and residential developments in the City'. This would result in an increase in improved levels of urban greening that should be factored into the early design stages of development schemes. Further guidance on the application of the UGF is provided at the end of the draft Local Plan, Appendix 1 -Technical note on applying the Urban Greening Factor. This explains how the factor is calculated and provides a table of factors for 16 Land Cover Types which closely follows those provided in the London Plan (GLA, 2021, Table 8.2, page 325).

Greater London Authority

4.10 The Greater London Authority (GLA) also developed its UGF proposals through an Urban Greening Factor for London Research Report (Grant, 2017) which explored the purpose, function, benefits and potential drawbacks of an UGF policy. The report included short descriptions of various international models from Berlin, Malmö, Seattle and Helsinki as well as feedback from a UGF Stakeholder Event held in May 2017. Initial proposals for a UGF were introduced in the London Environment Strategy (GLA, 2018) that set out the intention to include a new UGF in the London Plan to accelerate urban greening across the capital.

4.11 UGF Policy for London is now described in Policy G5 Urban Greening in the adopted London Plan (GLA, 2021) and has become a material consideration in planning decisions. This requires that 'all major development proposals contribute to the greening of London by including urban greening as a fundamental element of site and building design'. This includes a target score of 0.4 for predominantly residential development and a target score of 0.3 for predominantly commercial development which ensures that residential neighbourhoods have a particular emphasis on the provision of green infrastructure. The policy omits Land Uses B2 and B8 that include general industry, storage and distribution as the UGF target has generally proved unachievable or unviable in these locations.

4.12 A Viability Study was prepared as part of the scrutiny of the new London Plan (GLA, 2021). The Addendum Report (GLA, 2018, p12) assessed the potential costs of the new UGF policy and noted that 'this provides additional scope to achieve the UGF targets and will reduce the costs of additional green infrastructure provision'. Any cost impact was considered to be marginal as the proposed green cover elements were common landscape design features and incorporated in the benchmarked costs including an uplift for GI within the viability testing. Annex D of the report includes an annotated table on the cost implications of each UGF surface cover.

Swansea Council

4.13 Natural Resources Wales and Swansea Council have developed a Green Space Factor Tool as part of a Green Infrastructure Strategy (2021) for the Central Area of Swansea. This focuses on the main retail and commercial heart of the city leading south to the basin of the River Tawe and the Eastern Docks. The area is a strategic focus for development and regeneration described in the Swansea Central Area Regeneration Framework. Substantial investment in green infrastructure is considered a key element of the framework to enhance the quality and content of the public realm, improve the adaptation and mitigation to climate change and increase dwell-time in the city centre for economic benefit.

4.14 The strategy is aligned with the Statutory SuDS Standard 2019 and duties under the Well-being of Future Generations (Wales) Act 2015 and Environment (Wales)

Act 2016. It takes account of the Council's Well-being Objective to maintain and enhance Swansea's natural resources and biodiversity and the Swansea Public Service Board's Objective for Working with Nature. The strategy includes a Green Space Factor Tool to increase the quantity and functionality of GI schemes including increasing the permeability of surfaces and spaces to improve functionality and the delivery of ecosystem services. The UGF tool will be used to influence and measure green infrastructure design and development proposals across the Central Area.

The Use of the UGF in Planning Applications

4.15 Each case study included a review of planning applications to illustrate the practical application of UGF policies. Commonly UGF proposals were included in Design and Access Statements that are a formal requirement of planning applications. These provide a summary of the landscape and green infrastructure proposals and landscape master plans that are accompanied by a table or spreadsheet that illustrates the calculation of the UGF score. For some schemes this included a before and after development score that indicated the net-gain in greening. The GLA also recommends the provision of a color-coded UGF layout plan indicating the distribution of surface cover types which can be referenced in planning approvals.

5.0 Developing a model Urban Greening Factor for England

5.1 Developing a Model UGF Standard for England needs to establish two main components: (a) a target factor score that set a minimum proportion or percentage of greening for a particular site, area or land use; and, (b) a schedule of surface cover types and associated factor weightings that are used to calculate the score. Proposals for a Model UGF include both target scores for specific land uses and a set of weighted surface cover types. These have been informed by detailed research undertaken during Stage 2 of the GI Framework project and consolidated in Stage 3. Whilst the level of complexity varies across international applications the proposed model for England takes particular account of current UK practice to ensure this can align with existing and adopted policies.

5.2 An analysis of current UGF target scores is shown in Table 1 that indicates that the majority of applications have a target score of 0.3 for Commercial and 0.4 for Residential land uses.

Table 1 – Comparison of UK Urban Greening Target Scores

No	UGF Target Scores for Major Developments	Target Score - Minimum	City of London	Greater London Authority	London Borough of Hackney	London Borough of Hounslow	London Borough of Islington	London Borough of Sutton	London Borough of Waltham Forest	Portsmouth City Council	Southampton City Council	Swansea Council
1	An improvement in overall green infrastructure	**+**								Y	Y	
2	Previous developed sites to increase from baseline	**+ 0.2**						Y				
3	Developments that are predominately industrial	**0.2**				Y						
4	Developments to meet target score as a minimum	**0.3**	Y									
5	Developments that are predominately commercial	**0.3**		Y	Y	Y	Y		Y			Y
6	Developments that are predominately residential	**0.4**		Y	Y	Y	Y		Y			Y

Source - Analysis of Current Green Infrastructure and UGF Planning Policy in the UK, Paper 2.1 Appendix 2 Key: The letter 'Y' denotes that the local authority has a UGF Target Score of that amount for the type of green infrastructure improvement or development indicated. A blank cell indicates that no minimum target score was assigned by that local authority to that type of green infrastructure improvement or development.

Model UGF for England

5.3 The recommended minimum UGF target scores for major developments in England are:

- 0.3 for predominately commercial development
- 0.4 for predominately residential development

5.4 These target scores take account of current UGF planning practice and should be considered as a minimum benchmark rather than a maximum requirement. Development schemes should aim to meet and exceed these targets to demonstrate the positive contribution their design proposals will have on both urban greening and wider planning policies to achieve sustainable development. For example, additional target scores for different land uses such as industrial and greenfield development. A UGF such as 0.5 can be used for predominately residential development on greenfield sites. For mixed-use developments the land use class with the largest square metreage surface area should be used to determine the target score and if necessary, advice should be sought from the local planning authority.

5.5 Local Planning Authorities may choose to vary or add to these target scores in response to the local context, planning priorities and green infrastructure needs assessment. For example, variations to the proposed target scores should be supported by a robust evidence base that can be informed by in-house analysis using Geographic Information Systems (GIS) or reference to the National Green Infrastructure Mapping Database and Analysis prepared by Natural England (2021b).

5.6 The second component of UGF policy is a menu of green infrastructure elements or surface cover types that are used to calculate the UGF score which has four key elements:

- Vegetation and Tree Planting
- Green Roofs and Walls
- Sustainable Drainage Systems and Water Features
- Paved Surfaces

5.7 A weighting factor from 0.0 to 1.0 is assigned to each cover type reflecting its environmental and social value in urban greening; its functionality in providing ecosystem services and improving permeability; and, its benefit in supporting biodiversity and habitat creation. 22 different surface cover types and weightings are proposed and include a brief description for each. More detailed guidance for each cover type is provided in the User Guide that sets out guidance on their design and specification and the method of measurement.

5.8 The process of assigning weightings has been benchmarked by comparing the proposed surface covers with similar habitat types included in the Environmental

Benefits from Nature (EBN) Tool (Natural England, 2021c). This assigns a numerical value (1-10) for a suite of ecosystem services across individual habitat types, higher values are given to habitats that have greater functionality.

UGF User Manual

5.9 The User Guide provides a summary of the proposed UGF Model Standard for England and describes its purpose, how it should be applied, its structure and content, how it is calculated and associated planning issues that should be considered. The guide is for organisations and individuals involved in the planning and development process including planning authorities, planning consultants, applicants, developers, architects, landscape architects, urban designers, engineers, SuDS specialists, tree officers, ecologists and landscape managers.

5.10 The User Guide explains how UGF policies can contribute to meeting national and local planning objectives, ensuring that specific needs for green infrastructure are considered at the outset and are an integral part of development and infrastructure provision. The UGF can be applied to all types of urban development although it is recommended that it is first applied to major developments as defined by the Town and Country Planning Act which includes:

- the development of housing - for 10 dwellings or more, or where the area of the development site is 0.5 hectares or more.
- the development of other land uses - where the floor space to be created is 1,000 square metres or more, or the area of the development site is 1.0 hectares or more.

The full definition of a ‘major development’ is given in Part 1 of The Town and Country Planning (Development Management Procedure) (England) Order 2015.

5.11 The User Guide provides a full schedule and detailed description of the proposed surface cover types. This will ensure there is continuity in green infrastructure proposals that meet recognised standards of design, construction and management. The descriptions include reference to associated technical guidance and good practice including British Standards and Industry Regulations and should be seen as a means to inform rather than restrict the design process, improving the quality and functionality of green infrastructure proposals.

5.12 The schedule of surface cover types is not intended to be comprehensive but provides clear guidance to inform the design process. Where these descriptions do not exactly reflect a particular surface cover or green infrastructure element proposed for a development scheme then the nearest surface cover and weighting should be used with a supporting rationale for why this weighting has been selected. Local Planning Authorities may choose to amend the number of surface

cover types or add additional surface covers, descriptions, specifications and weightings to reflect local circumstances and priorities for urban greening.

5.13 The User Guide also provides a worked example on calculating a UGF score for a theoretical development site. It also explains how UGF should be included in planning applications to ensure urban greening proposals are locked into subsequent planning approvals. This also recommends that a landscape management plan is included as part of the planning application that describes how the green infrastructure will be maintained in the long-term.

6.0 The Menu of Green Infrastructure Standards

6.1 The UGF is one of the five Headline Green Infrastructure Standards (Natural England, 2023b) within the Green Infrastructure Framework – Principles and Standards for England. The five Headline Green Infrastructure Standards guide the quantity, accessibility/ proximity, capacity, function and quality of the green infrastructure. Used together they will help to deliver the five 'What' Principles, which in turn will help the resulting green infrastructure to deliver the five 'Why' Principles (benefits) (See paragraphs 6.6 – 6.7). The Headline Green Infrastructure Standards are for use by local planning authorities and other stakeholders informed by local knowledge and evidence to:

- Undertake initial green infrastructure planning exercises, e.g. develop a vision for local green infrastructure and understanding of current green infrastructure provision, needs and priorities.
- Set key local green infrastructure targets
- Monitor and evaluate green infrastructure provision.

6.2 Headline Green Infrastructure Standards incorporate a set of updated standards for Accessible Greenspace (AGS) including the Green Flag Award Criteria (see paragraphs 6.3 - 6.5).

6.3 The Headline Standards are supported by a Menu of Green Infrastructure Standards which sets out a more comprehensive range of green infrastructure standards, tools and best-practice checklists, for in-depth green infrastructure planning, to deliver the 15 Green Infrastructure Principles. The Menu will be published separately by Natural England and provide a set of quantitative and qualitative measures that address accessibility, connectivity, character, function and variety of GI. The Menu signposts to the most relevant existing standards and appraisal systems, including Fields in Trust, SuDS Technical Standards, Green Roof Codes and Building with Nature Guidance.

Accessible Greenspace Standard (AGS)

6.4 The Accessible Greenspace Standard (AGS) has been updated by Natural England as part of the Green Infrastructure Framework. AGS is an established planning tool to assess the level of accessibility to greenspaces and sets quantity and accessibility standards for the provision of different sizes of green space. These include Doorstep, Local, Neighbourhood, Wider Neighbourhood, District and Sub-Regional Greenspace (Natural England, 2023).

6.5 AGS and UGF should be considered as complementary planning tools aligned to the national Green Infrastructure Principles and serve to meet a variety of green infrastructure needs and outcomes. AGS focuses on the strategic supply of publicly accessible greenspace to ensure districts have adequate provision and distribution of greenspace within easy access for residents. The supply and management of accessible greenspace is generally, but not exclusively, the responsibility of local authorities and the public sector.

6.6 UGFs provides an additional mechanism to increase the provision of green infrastructure within development sites and through the development process. This is generally, but not exclusively, undertaken by the private sector through site-based planning applications and approvals although green space provision may not necessarily be publicly accessible. UGF is deliberately named as a tool for Urban Greening rather than as a Green Space Factor as it provides the means to increase the quantity, quality and functionality of green infrastructure. In combination AGS and UGF provide the means to improve green infrastructure provision through both strategic planning and site-based approaches to increase both publicly accessible green space and urban greening overall.

National Green Infrastructure Principles and Processes

6.7 The use of the UGF planning tool should be aligned with Natural England's Principles and Processes for improving the delivery of green infrastructure. The suite of National Green Infrastructure Principles (Natural England, 2021d) describes the benefits, characteristics and processes (the Why, What and How) that are needed to deliver good quality green infrastructure. A set of GI Process Journeys provide additional guidance. The Model UGF can support the delivery of these principles and can help to create more nature-rich places and nature recovery, improve surface water management through more permeable green cover and increase the environmental resilience of places.

6.8 The UGF can improve access to good quality and functional green spaces by promoting higher levels of site-based green infrastructure through the development process. It can facilitate early discussion and negotiations in the planning process and provide a comparative basis to measure and assess proposals during design development. It also provides a useful measure or indicator to assess the delivery

of green infrastructure through the development planning process. This can be achieved by setting KPIs for the delivery of the UGF in general or for specific urban greening elements that are identified as local plan priorities.

Green Infrastructure Planning and Design Guide

6.9 The Green Infrastructure Planning and Design Guide (Natural England, 2023a) provides practical evidence-based guidance on how to plan and design good green infrastructure. It complements the National Model Design Code and National Design Guide and can be used to help planners and designers develop local design guides and codes with multifunctional green infrastructure at the heart. This will help to inspire the creation of nature-rich, healthier, climate resilient and thriving places to live, learn, work and play. The guide sets out:

- how to apply the Green Infrastructure Framework, including the Green Infrastructure Principles and Standards in design:
- how to design Green Infrastructure features as 'building blocks' of a larger connected network;
- how to combine Green Infrastructure features in different 'area types' to create multifunctional and connected networks at different scales and in different area types;
- how to design Green Infrastructure to meet identified needs (i.e. delivering ecosystem services) with a particular focus on nature, health, climate change, water management and prosperity;
- how to develop landscape-led Green Infrastructure with a focus on landscape character and local distinctiveness;
- how tools such as Biodiversity Net Gain, Urban Greening Factors, Local Nature Recovery Strategies can support design of good Green Infrastructure;

6.10 UGF policies can be applied across the scales from regional and sub-regional to local authorities, neighbourhoods and individual sites but ultimately, they are used to improve the greening of developments. The Green Infrastructure Planning and Design Guide will provide an important reference manual for developing design proposals that will need to meet UGF planning policy targets. The application of UGF policy should therefore be seen to work alongside the Green Infrastructure Planning and Design Guide and other national guidance including the National Design Guide (DLUHC, 2021b) and the National Model Design Code (DLUHC, 2021c) as well as local planning policies and guidance.

Local Nature Recovery Strategies (LNRS)

6.11 Local Nature Recovery Strategies (LNRSs) are new locally led, mandatory spatial strategies for nature required by the Environment Act 2021. LNRSs are tools designed to drive more coordinated, practical, and focussed action to help nature and establish the Nature Recovery Network. The strategies are intended to work

closely alongside other measures in the Act to support delivery of mandatory biodiversity net gain and provide a focus for a strengthened duty on all public authorities to conserve and enhance biodiversity. They will also help to develop partnerships and to integrate nature into our incentives and land management activities.

6.12 LNRSs will provide a shared spatial framework for improving local environments and draw on other relevant spatial plans and strategies such as GI strategies. It will be important to link GI strategies to Local Nature Recovery Strategies so that they work together and support each other. In due course Local Nature Recovery Strategies will provide an important framework for developing and applying green infrastructure policies to promote urban nature conservation.

6.13 GI strategies and polices can be used to support aspirations for a Nature Recovery Network (NRN), connecting across urban, urban-fringe, coastal and rural areas and enhancing landscape character. Applying the new Headline Green Infrastructure Standards will help to support the creation and restoration of wildlife rich habitats. Green infrastructure will also help urban districts and local authorities, in particular to meet their statutory duty to conserve and enhance biodiversity.

6.14 UGF polices can be used to strengthen wildlife networks and improve specific habitats for nationally important species including wetlands, woodlands, native hedgerows and grasslands. Biodiversity Action Plans can also provide a valuable evidence base for targeting of UGF policies alongside Tree and Woodland Strategies and Open Space Strategies.

Environmental Benefits from Nature Tool (EBN)

6.15 The EBN tool (Natural England, 2021c) is used to assess and measure the provision of ecosystem services (ESS) across recognised natural habitats. It uses a habitat-based proxy metric and is principally used to measure environmental net gain and improve the delivery across 18 ecosystem services using a 0-10 scoring matrix. Whilst EBN and UGF operate in different ways they serve a similar purpose in seeking to increase GI quality and functionality. Whilst the EBN tool would add a significant level of complexity to calculations, it could offer an associated tool for UGF providing a more in-depth analysis and assessment of ESS where this is needed.

Management and Maintenance

6.16 It is essential that green infrastructure is properly maintained so that it will fulfil the functions and meet the standards of quality defined by UGF policy and agreed via planning approvals. The Green Flag Award Standard provides the most established process to review the standard of management and maintenance for green spaces

that are generally publicly accessible. Landscape Management Plans provide a mechanism to achieve these objectives and can either be a requirement of UGF policy or included in the planning application and approval process. They should describe the actions and responsibilities that will be required to establish and then maintain green infrastructure elements that are delivered as part of a UGF scheme. The long-term maintenance regime should be considered during the design and development process and described in the UGF application.

Monitoring and Review

6.17 Local Planning Authorities are required to publish Annual Monitoring Reports (AMR) on the implementation of their local development scheme and to demonstrate whether the policies and objectives in local plans are being achieved. This includes data on planning permissions and development completions as well as the delivery of key performance indicators (KPIs) that are linked to the Local Plan objectives. The AMR provides a means to measure progress towards set targets and milestones which can include indicators for the provision of green infrastructure, public open space and urban greening elements such as tree canopy cover.

6.18 UGFs provide a useful measure or indicator to assess the delivery of green infrastructure through the planning process. This can be achieved by setting KPIs for the delivery of the UGF in general or for specific elements of urban greening, such as SuDS drainage systems and tree planting that may be identified as local plan priorities. Local Planning Authorities should use the Annual Monitoring process to assess the impact and effectiveness of the UGF policy and target scores. This may include an analysis of the proportion of planning applications that have used, met and exceeded the UGF target score as well as post construction appraisals that can assess the quality of delivery, establishment and management. Periodic reviews of the UGF policy, which may be undertaken as part of the cycle of Local Plan review, will ensure the targets remain both ambitious and achievable and are meeting the overarching planning goal to improve the quality and quantity of urban greening.

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Appendix 1 – Green Infrastructure Framework Advisory Group Members

Organisation in the Green Infrastructure Framework Advisory group:

1. Activity Alliance
2. AECOM
3. Berkeley Homes
4. Birmingham City Council
5. Birmingham City University
6. Brillianto
7. Buckinghamshire County Council
8. Building Research Establishment
9. Building with Nature
10. Cambridge City Council
11. Canal and River Trust
12. Chartered Institute of Ecology and Environmental Management
13. Chartered Institute of Water and Environmental Management (CIWEM)
14. Chilterns AONB Unit
15. Construction Industry Research and Information Association (CIRIA)
16. Core Cities Group
17. Cornwall Council
18. Country Land and Business Association
19. Cycling UK
20. Department for Food and Rural Affairs
21. Ecosystems Knowledge Network
22. Eden Project
23. Environment Agency
24. Essex County Council
25. Field Studies Council
26. Fields In Trust
27. Forestry Commission
28. Friends of the Earth
29. Future Parks
30. Gloucestershire Wildlife Trust
31. Greater Manchester Combined Authorities
32. Groundwork
33. Historic England
34. Home Builders Federation
35. Homes England
36. Keep Britain Tidy
37. Land Trust
38. Landscape Institute
39. Lendlease
40. Local Government Association

41. Lockhart Garratt
42. Mind
43. Mott MacDonald
44. National Federation of Parks and Greenspaces
45. National Grid
46. National Infrastructure Commission
47. Natural England
48. Nene Park Trust
49. Nottingham City Council
50. Office for Health Improvement and Disparities
51. Open Spaces Society
52. Ordnance Survey
53. Parks Alliance
54. Peel Land and Property Group Management Limited
55. Royal Society of Protection of Birds
56. Sport England
57. Sustrans
58. The Association of Directors of Environment, Economy, Planning and Transport
59. The Department for Health and Social Care
60. The Ramblers
61. The Rivers Trust
62. The Wildlife Trust
63. Town and Country Planning Association
64. UK Green Building Council
65. University of Manchester
66. University of Northumbria
67. University of Oxford
68. University of the West of England
69. Urban Nature Ltd
70. Urban&Civic
71. Wildfowl and Wetlands Trust
72. Wildlife and Countryside Link
73. WSP Global Inc

Appendix 2 – Stages of Urban Greening Factor Research

1. The development of the UGF described in this report was commissioned and led by Natural England on behalf of Defra, and was undertaken between September 2021 and March 2022.
2. It builds on research undertaken during earlier stages of the development of the GI Framework between 2019 and 2020, and contributes to a set of eight papers on UGF applications, as set out below.

Stage 1 (2018-19)

This work was contracted to LDA Design, and led by Frazer Osment. The output was an unpublished report: GI Standards Framework Interim Report (2019).

Stage 2 (2020)

This work was contracted to the University of Manchester. Dr Ian Mell led the delivery of the contract. Peter Neal was the lead author of the briefing papers (unpublished, 2020) below:

2.1 - A Review of UGF Applications

This paper introduces the concept and describes the chronological development of Urban Greening Factors using a structured review of the academic and grey literature. It provides a description of both international practice and UK applications and includes a summary of existing policies, guidance and the process of application and implementation. It assesses the extent of the evidence base that has been used to develop specific Urban Greening Factors and provides a review of surveys, assessments and evaluations that gauge the effectiveness of the planning tool.

2.2 - An Assessment of UGF and Ecosystem Services

This paper provides a review of the approach and effectiveness of Urban Greening Factors in delivering ecosystem services (ESS). It uses a familiar evaluative framework of supporting, regulating, provisioning and cultural service headings. Particular attention is given to factors that prioritise the water-holding capacity of vegetated surface covers and soils that have commonly been used as a proxy for delivering wider ESS benefits.

2.3 - An Analysis of UGF Metrics, Net Gain and Scale of Application

This paper provides an analysis of the metrics commonly used in Urban Greening Factors that incorporate specific socio-cultural, economic and ecological parameters. It assesses the role that Urban Greening Factors can play in spatial planning and their potential use in analysing the nature of green infrastructure provision, demonstrating net gain and their ability to work alongside other net gain metrics including the Biodiversity Metric and Eco-metric.

2.4 - A Review of the use of UGF to meet Local Needs and Inform Targets

This paper considers the flexibility of Urban Greening Factors in meeting particular local needs and how inclusive and collaborative approaches including stakeholder consultation and public engagement can inform their development. This may help to prioritise the delivery of specific ESS alongside other cultural, recreational and placemaking objectives and describes how the use of Urban Greening Factors can inform national and local targets for ESS and green infrastructure provision.

Stage 3 (2021-22)

This work was contracted to Peter Neal, who was the lead author of the papers below.

Technical Papers (published 2023)

- 3.1 - Urban Greening Factor for England - Case Studies
- 3.2 - Urban Greening Factor for England - Development and Technical Analysis
- 3.3 - Urban Greening Factor for England - User Guide
- 3.4 - Urban Greening Factor for England - Summary Report

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