Southampton Green Space Factor Guidance 2024

Contents

1. Introduction

Southampton City Council have been pioneers in being early UK adopters of an Urban Greening Factor, as detailed in Natural England's *Urban Greening Factor for England – Case Studies January 2023* (Table 1). What we have called the 'Green Space Factor' has been in adopted policy since March 2015 as part of the City Centre Area Action Plan. However, the tool needs a review to ensure it is up to date and accurately reflects the latest evidence available. Therefore, this guidance document seeks to set out the changes made to the tool and the rationale behind this. The intention is to expand this to the whole city through the City Vision (new Local Plan).

Guiding Principles of GI

1. Multifunctional - making sure that all GI in the city centre provides as many benefits as possible. For example, it may reduce pollution and/or flooding, offer shelter and/or food for native animals (birds, insects and/or small mammals), provide shade during hot summer days, and create attractive pleasant and/or calming spaces for people to meet, relax and play.

2. Adapted for climate change - absorbing water to reduce flooding, providing summer cooling and accommodating wildlife. GI also helps mitigate climate change by capturing and locking up carbon.

3. Healthy - helping our physical and mental health by absorbing pollution, providing clean air, clean water, food and space to exercise, socialise and play and space to have contact with nature.

4. Biodiverse – recognising that all life depends on biodiversity and the maintenance of healthy resilient ecosystems supporting a wide variety of native species providing shelter and food and creating green corridors across the city centre linking to existing strategic wildlife corridors.

5. Smart and Sustainable - providing nature-based solutions, techniques and technologies that are low maintenance and reduce pollution and waste and maximise the use of recycled or sustainably sourced materials.

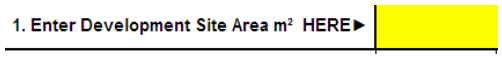
2. How to Use the Tool

Vegetation (green infrastructure) within the city provides many important benefits (ecosystem services) which make the city an attractive and resilient place to live. Key benefits include surface water and air quality management, evaporative cooling and biodiversity. The Green Space Factor (GSF) is a tool which allocates a score to different types of surfaces based on infiltration potential, which is used as a proxy for ecosystems services provided by the different surfaces, e.g. cooling, air quality, biodiversity. There is a back-ground paper available on how this was developed.

The GSF is scored from 0 to 1, where impermeable surfaces are scored as 0 and surfaces with the highest green space factor are scored 1. There are detailed definitions of the different surface types on the tool tab, and p.5 of this guidance. The Green Space factor tool is a simple excel spreadsheet. Enter values in the yellow areas and the scores will be calculated for you.

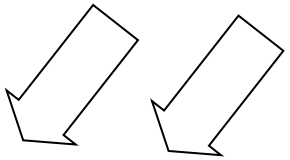
- Different scenarios can be used to see what provides the best GSF score.
- The aim is to increase the Green Space Factor as much as possible.
- **Note the Development Site Area (1) should be the same as the <u>total</u> of the current surface areas (2) and the <u>total</u> of the proposed surface areas (3). Warnings will come up if they are not the same.**

1) Enter Development Site Area



2) There is a column for the existing development site in which you can insert the areas in m2 of the current surface types.

3) The right hand side column can then be used to insert the proposed surface areas



	Surface Type (see tab for detailed descriptions)	Factor	2. Current Surface Area m²	3.Proposed Surface Area m²
Category	**Primary (Site Plan) Layers**			
	Intensive greenroofs	0.7	0.00	0.00
	Extensive greenroofs biodiverse green roof (meets the GRO code*, may include biosolar)	0.6	0.00	0.00
	Extensive greenroof (meets GRO code)	0.5	0.00	0.00
	Extensive sedum only roof (does not meet the GRO code)	0.3	0.00	0.00
Roof cover	Building surface area with no green roof	0.0	0.00	0.00
	Semi-permeable surfaces e.g. sand and gravel	0.2	0.00	0.00
	Permeable paving	0.1	0.00	0.00
Hard surfacing	Non-permeable surfaces	0.0	0.00	0.00
	Grassland (long, rough)	0.5	0.00	0.00
Grassland	Grassland (short, amenity)	0.4	0.00	0.00
	Woodland/ Trees on deeper soil	1.0	0.00	0.00
	Semi-mature trees in connected tree pits	0.9	0.00	0.00
	Mixed native hedgerow planting	0.8	0.00	0.00
	Food growing, orchards and allotments	0.7	0.00	0.00
	Amenity shrub planting	0.6	0.00	0.00
Trees and Shrubs	Trees on shallow soil/ individual tree pits	0.6	0.00	0.00
	Wetlands and semi-natural open Water	1.0	0.00	0.00
	Rain gardens and vegatated attenuation basins including planters	0.7	0.00	0.00
	Open swales and unplanted dention basins	0.5	0.00	0.00
SUDS features	Water features (unplanted and chlorinated)	0.2	0.00	0.00
	Development Area Total		0.00	0.00

4) Green walls can be added as an additional layer to boost the proposed score.

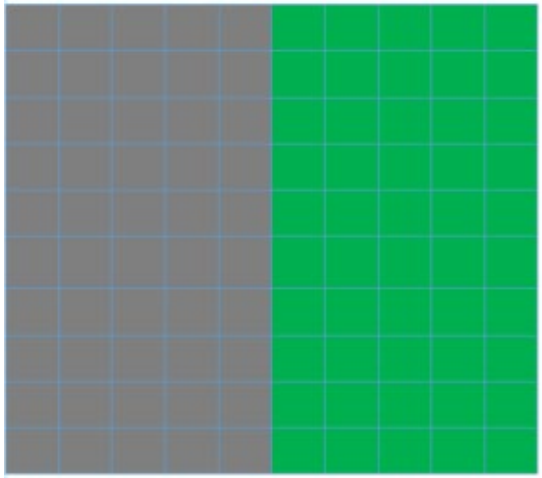
Secondary Layers			
Green walls with a height limit of 10 metres (area of)	0.6	0.00	0.00

Simplified development example

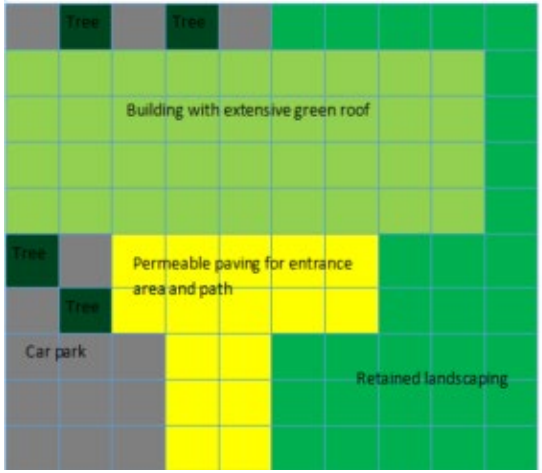
Key

- Extensive green roof
- Non-permeable surface
- Permeable paving
- Woodland/ trees on deeper soil
- Tree in shallow soil/ tree

Current site Layout:



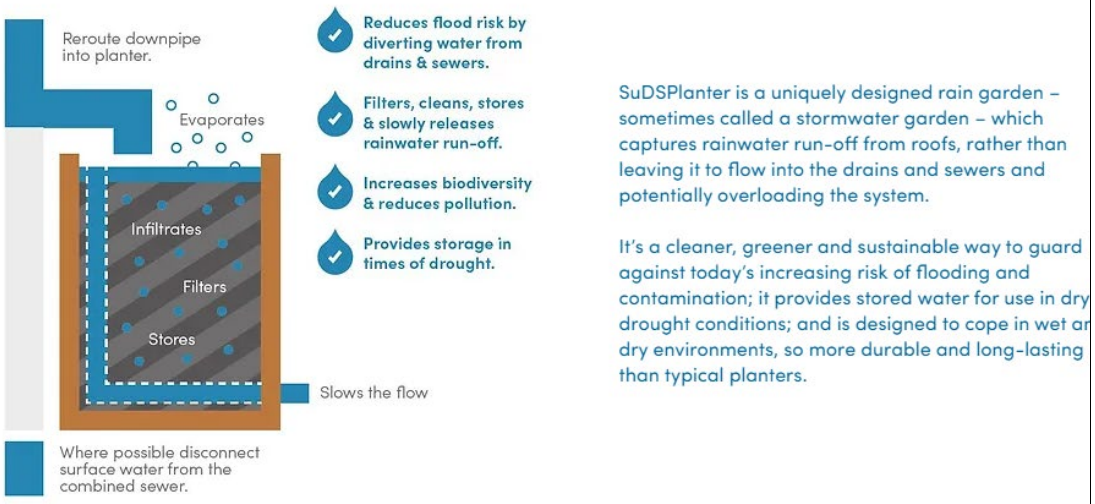
Proposed surface layout



Guidance on Layer Types

Defintions	
Intensive greenroofs	High maintenance accessible green roof with planting and a depth of growing substrate with a minimum settled depth of 150mm. Intensive green roofs use a wide variety of plant species that may include trees and shrubs, require deeper substrate layers, are generally limited to flat roofs, require 'intense' maintenance, and are often park-like areas accessible to the general public.
Extensive greenroofs biodiverse green roof (meets the GRO code*, may include biosolar)	Green roof with species-rich planting, with limited access, may 17 of 43 No UGF Surface Cover Type Factor General Description include photovoltaics, the depth of growing substrate is 100 - 150mm.
Extensive greenroof (meets GRO code)	Low maintenance green roof, limited species mix in planting and with no access, the depth of growing substrate is 80 - 150mm.
Extensive sedum only roof (does not meet the GRO code)	Low maintenance sedum green roof, no access, combined depth of growing substrate, including sedum blanket, is less than 80mm.
Building surface area with no green roof	Building surface area with no green roof
Open aggregate and granular paving	Porous paving using gravels, sands and small stones as well as recycled materials that allow water to infiltrate across the entire surface.
Partially sealed and semi-permeable paving	Stone paving with joints where water can infiltrate, permeable macadam**. Un-grouted paving is discouraged as it allows establishment of weeds and designs-in the requirement for routine herbicide application. We want to see a Glysophate free city. We can best do this by designing out harbourage in hard surfacing.** Therefore we favour continuous surfacing such as permeable macadam or (recycled) rubber crumb. We tend to avoid resin bonded gravel surfaces as they are relatively short lived and are prone to cracking, also any patching cannot be matched to the original surface.
Non-permeable surfaces	Impervious paving constructed of concrete, asphalt or sealed paving units that do not allow water to percolate through the surface.
Grassland (long, rough)	Rough grassland that is not being cut regularly. Predominatly grasses but may contain other plants. Natural and amenity grasslands can be found on deep soils, however this likely to be of little use for surface water management as the water's path into the soil is blocked by a dense root mat occurring within the top 5-10cm of soil.

Grassland (short, amenity)	Where the majority of vegetation is grasses, generally short mown, e.g. for amenity space, Grasslands, particularly amenity grasslands found in urban areas, have a higher degree of soil compaction than woodlands and scrub. This results in a loss of soil pores which further impedes water infiltration and reduces the amount of water that can be held. Short mown grasslands have lower water attenuation ability than longer grass because the lack of aerial vegetation means there is little protection for the soil and it consequently dries out very quickly. This results in a hard surface which water simply runs off. At SCC, have reduced the amount of close mown grassland in favour of species rich grassland managed as meadows. **However, there is a need for recreation and we encourage healthy lifestyles which includes recreation.** We are looking to fund essential decompaction (by pressurised air injection) to improve the porosity and gaseous exchange of grassland compacted by event footfall and vehicle damage.
Woodland/ Trees on deeper soil	Vegetation where plants have direct contact with deeper soil. Trees and shrubs, have a more open network of surface roots plus bigger, deeper roots which channel water into the soil. Water can therefore percolate into the ground more easily and run down the stem and roots; in this case deep soil is useful because it can hold more water than shallow soil.
Semi-mature trees in connected tree pits	Tree planting established within engineered and interconnected systems with structural soils to maintain tree health at maturity.
Mixed native hedgerow planting	Dense linear planting of mixed native hedgerow species, at least 800mm wide and planted two or more plants wide
Food growing, orchards and allotments	Areas and facilities provided for local allotment and communitybased food growing including formal orchards with fruit trees.
Amenity shrub planting	Areas of formal and informal nonnative shrub and ground cover planting connected to sub-soils at ground level or in planters.
Trees on shallow soil/ individual tree pits	Tree planting established within separate designed tree pits with structural soils to maintain tree health at maturity.
Wetlands and semi-natural open Water	Areas of semi-natural wetland habitat with open water for at least six months per year contributing to surface water management.
Rain gardens and vegatated attenuation basins including planters	Rain gardens, also called bioretention facilities, are one of a variety of practices designed to increase rain runoff reabsorption by the soil. They can also be used to treat polluted stormwater runoff. Rain gardens are designed landscape sites that reduce the flow rate, total quantity, and pollutant load of runoff from impervious urban areas like roofs, driveways, walkways, parking lots, and compacted lawn areas.

	Attenuation Planters Home | sudsplanter 
Open swales and unplanted dention basins	Sustainable drainage systems to convey and temporarily hold surface water in detention basins with minimal vegetation cover.
Water features (unplanted and chlorinated)	Ornamental and generally chemically treated water features providing amenity value but with minimal biodiversity and habitat benefit.
Green Walls	Vegetated walls with climbing plants rooted in soil supported by cables or modular planted systems with growing substrate and irrigation. **Single use plastic modular green walls which are 100% reliant on intensive irrigation and feeding (with artificial fertilizers) for their entire life and a requirement for frequent replacements are discouraged.** Failure of intensive care systems are catastrophic very quickly and very expensive to run. **Our preference is for climbing plants over walls, which have the same positive cooling and pollutant sequestering qualities but are more reliable and planted in the ground, need no additional irrigation (once established) or feeding with artificial fertilizers.**

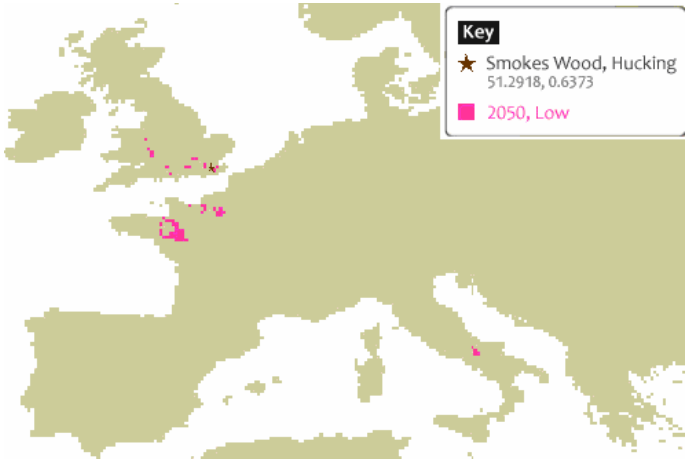
*https://www.greenrooforganisation.org/wp-content/uploads/2021/03/GRO-Code-2021-Anniversary-Edition.pdf

3. Resilience to long term changes brought by climate change

Biodiversity Loss

- Going forward, climate change presents an unknown, in terms of how our native species will adapt. To give our natural environment the best chance of adapting successfully, as a general rule, we need to make new **native** planting as **diverse** as possible. We know that across the UK there are variants within our native species, where local conditions have resulted in adaptation over time. Provided that climate change does not accelerate too quickly, the hope will be that the same will happen.

- The Forestry Commission's current guidance on this topic (See the research publication) suggests that we **should look to source two-thirds of new planting using seed which has originated from 2 degrees latitude further south** to assist with this process, with the remaining stock comprising plants grown from local seed. There is a strong view in purist ecological academia to only use locally sourced natives. However, wider gene pools could make species more resilient to novel endemic disease such as Hymenoscyphus fraxineus. The Forestry Commission have facilities to collect, grow and produce specific seed stock. We have to rely on a relatively few commercial tree nurseries so we are to an extent restricted to what they have chosen to grow. In common with most of their customers we need to plant stock of a certain size to stand a chance to avoid them being snapped off as a result of vandalism. They are therefore necessarily older stock so getting tree nurseries to change their lines is a gradual process. We can only work with what trees are available on the market, while feeding back to the growers what we want, e.g., native species (not cultivars) with single flowers not double flowered cultivars etc.



- Here is also the notion that **certain UK native species will be better at coping with extremes of weather**. For example, river floodplain plant species are used for periodic waterlogging, and dry periods during the summer months.

- In terms of **non-native planting**, those that help support native faunal species, such as 'pollinator plants' should be promoted, as these will help bolster and promote these creatures. For non-native planting, there is also a wider palette to select from in a process known as **'climate matching',** with the opportunity to identify plants native to Europe that will be suited to our future climate

Drought and Extreme Heat

- local water management plans and design natural systems that help communities conserve and reuse water.

- design green roofs, walls, and streets, and other green infrastructure as zones to inhabit during extreme heat events and hotter-than-average summers. Landscape architects can identify the tree and plant species best suited to generate a cooling effect while minimizing harmful volatile organic compounds (VOCs).

Flooding

- Flooding is a highly local problem: there are inland and coastal floods; floods caused by storms or sea level rise, floods caused by groundwater or sea water; and floods that have multiple causes. So solutions must be designed for particular conditions. Landscape architects develop multi-use systems that can serve as public spaces and flooding solutions. Landscape architects can deploy their understanding of topography, hydrology, and ecology to create systems that divert, absorb, or capture water. Landscape architects are well trained to work with planners, ecologists, engineers, architects, and others to plan, design and implement these systems.

Plant in groups and communities

- A multi-layered approach to planting that mimics natural habitats will bring optimum benefits. A shrub understorey and ground flora layer can also contribute to carbon capture, increase interception, reduce run-off and reduce the urban heat island effect, whilst also preserving well-structured soils fed with organic matter. Connected tree pits will be preferable to individual tree pits.

- The importance of good, healthy soils should not be underestimated in terms of the carbon sink that they provide and their resilience to extremes of weather. Good soil structure will aid drainage during periods of high rainfall, and organic content is essential for humus-rich soils to retain moisture for plants to use during periods of drought. For managed landscapes, the retention and application of shredded plant matter such as mulch, not only benefits the soil as it breaks down but also suppresses weeds, eliminating the need for hand weeding or herbicide application.

- Care needs to be taken when applying uncomposted chippings to shrub beds as the decomposition process depletes nitrogen which can be deleterious to the existing planting, which is why horticulturists will always state well-rotted organic matter. Further, often the prunings being

shredded and returned to the bed will contain diseased dead material (which is why it has been pruned away from the healthy plant). This diseased material can lead to overall degradation of the health of the existing vegetation in these quantities, all at once. Naturally, this would be a much slower and more incremental process.

4. GSF and Biodiversity Net Gain

Planning policies and decisions should contribute to and enhance the natural and local environment by 'minimising environmental impacts on and providing net gains for biodiversity' (NPPF /2023, 180d). Natural Environment Planning Practice Guidance (2019) provides further detail on how this can be achieved and the requirement for net gain has now been strengthened by the Environment Act (2021) that has mandated a minimum 10% gain by February 2024. The gain should be calculated using the latest version of the Biodiversity Metric42 (2021) which takes a habitat-based approach to determining a proxy biodiversity value and assesses changes in biodiversity value from the development process. Where local planning authorities choose to apply GSF to smaller sites a Small Sites Metric43 (2021) is available as a beta test version for sites that do not meet the criteria to be considered as 'major development.'

The use of urban greening policies and the application of the GSF tool should be seen to facilitate this net gain process. It is not uncommon for urban and brownfield development sites to have no or very limited biodiversity baseline level where subsequent net gains for biodiversity, including a mandatory 10% net gain, may be relatively modest. Local planning polices for biodiversity should promote an ecologically informed approach to design and development in accordance with the National Planning Policy Framework to increase the biodiversity baseline and enhance ecological connectivity to support Local Nature Recovery Strategies (LNRS). This can be further strengthened with the use of UGF policies that define specific urban greening objectives for particular locations and land uses and can help to set the quantity and quality of GI that should be delivered on-site.

For those sites which are exempt from BNG (such as those with no biodiversity on site currently), there is an expectation that a minimum 10% of surfaces will be covered by green and blue infrastructure which provides habitat and the GSF tool can be used to demonstrate this.

5. Changes to tool since City Centre Action Plan 2015 version

CHANGE	RATIONALE
Different types of Tree Pit	Encourage more mature, better supported trees and integrated SUDS
Separate Category for native hedgerows	Increase biodiversity and support native species, support biodiversity net gain
New category for food growing	Support wider sustainability and emissions reduction through supporting healthy local food production. Alignment with Southampton National Park City aims.
Differentiate between different types of extensive roof	To encourage roofs which comply with Green Roof Organisation principles and provide most benefits
Differentiate between different water features/ SUDS	To encourage SUDS features such as rainwater gardens and swales but reduce value of unplanted and chlorinated open water
Downgrade sand and gravel from 0.4 to 0.2	To take account for reduced biodiversity benefits and ecosystem service benefits in comparison with other surface types in line with Natural England's guidance
Downgrade permeable paving from 0.2 to 0.1	To take account for reduced biodiversity and ecosystem service benefits in comparison with other surface types in line with Natural England's guidance
Increase overall target score to 0.3 in line with Natural England's recommendations, London's Urban Greening Factor, Swansea etc. There has been some discussion on whether the target UGF factor of 0.3 should be set higher but the policy is clear that this should be considered a minimum target. Interim target until City Vision adopted where 0.4 for residential is proposed, in line with Natural England's recommendations.	Urgent need to improve greening to combat urban heat island effect, flooding and other impacts which pose increased risks due to climate change.

6. Additional Sources of Information

Green Infrastructure Home (naturalengland.org.uk)

Urban Greening Factor for England – Development and Technical Analysis - NERR132 (naturalengland.org.uk)

Natural England Green Infrastructure Planning and Design Guide 2023

Urban Greening Factor Study (cityoflondon.gov.uk)

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9a_Climate Change Park Maps.pdf - Google Drive

Climate-Wise Landscaping - Ecological Landscape Alliance (ecolandscaping.org)

Climate Change and Role of the Landscape Professional - TEP - The Environment PartnershipTEP – The Environment Partnership

12510-LANDSCAPE-2030.pdf (aila.org.au)

Tree Species Selection for Green Infrastructure - Trees and Design Action Group (tdag.org.uk)

Glossary

Urban heat island effect - Urban areas usually experience the urban heat island (UHI) effect, that is, they are significantly warmer than surrounding rural areas. The temperature difference is usually larger at night than during the day,[1] The main cause of the UHI effect is from the modification of land surfaces while waste heat generated by energy usage is a secondary contributor.

GRO code: Green Roof Organisation | Not for profit trade association

Using the Green Space Factor can also assist in achieving other mandatory requirements, e.g. BREEAM.

BREEAM Credits

Green infrastructure water attenuation can be component of a Sustainable Drainage System (SuDS) which can achieve 1 credit under BREEAM **Pol 03.**

A green roof in combination with a storage tank can be part of a rainwater harvesting system which helps to gain credits in BREEAM **Wat 01/ Wat 04** by reducing the use of mains water.

There are potential credits for both ecological enhancement and change of ecological value of the site by planting with native plant species as approved by a suitably qualified ecologist. BREEAM **LE 02-05**.

Green roofs will improve a building's thermal performance. This will help reduce the predicted Dwelling Emission Rate (DER) for the building which is the estimated carbon dioxide emissions per m^2 for energy use in heating, hot water and lighting. The lower DER the green roof causes may help to gain an extra credit under BREEAM **Ene 01**.

In a high density development it can be difficult to achieve **amenity space**. Roof terraces, i.e. intensive green roofs, whether private or communal gardens, can provide this.

Please contact Southampton City Council

Planning Ecologist—Lindsay.McCulloch@southampton.gov.uk

Sustainable Projects Officer—Melanie.Robertson@southampton.gov.uk

if you would like further advice on using Southampton's Green Space Factor Tool.

Appendix 1 – Comparing Natural England's National Uban Greening Factor

Southampton's GSF 2015

Surface Type (see tab for detailed descriptions)	Factor
Primary (Ground Level) Layers	
Building surface area with no green roof	0.0
Extensive greenroofs	0.6
Intensive greenroofs	0.7
Non-permeable surfaces	0.0
Permeable paving	0.2
Semi-permeable surfaces e.g. sand and gravel	0.4
Grassland (short, amenity)	0.4
Grassland (long, rough)	0.5
Shrubs	0.6
Trees on shallow soil/ tree pits	0.6
Woodland/ Trees on deeper soil	1.0
Open Water	1.0
Secondary Layers	
Green walls with a height limit of 10 metres (area of)	0.6

No.	Natural England's National UGF Surface Cover Type	Factor	Comparison to 2015 Southampton and commentary
1	Semi-natural vegetation and wetlands retained on site (including existing / mature trees)	1.0	Woodland/ Trees on deeper soil
2	Semi-natural vegetation established on site	1.0	Woodland/ Trees on deeper soil
3	Standard / semi-mature trees (planted in connected tree pits)	0.9	0.6 for trees on shallow soil / tree pits
4	Native hedgerow planting (using mixed native species)	0.8	0.6 for Shrubs
5	Standard / semi-mature trees (planted in individual tree pits)	0.7	0.6 for trees on shallow soil/ tree pits
6	Food growing, orchards and allotments	0.7	n/a
7	Flower rich perennial and herbaceous planting	0.7	Equivalent is Grassland (long, rough) 0.5
8	Single Species or mixed hedge planting (including linear planting of mature shrubs)	0.6	This reflects Shrubs 0.6
9	Amenity shrub and ground cover planting	0.5	Shrubs 0.6
10	Amenity grasslands including formal lawns	0.4	This reflects Grassland (short, amenity)
11	Intensive green roof (meets the Green Roof Organisation / GRO Code)	0.8	0.7

12	Extensive biodiverse green roof (meets the GRO Code, may include Biosolar)	0.7	0.6
13	Extensive green roof (meets GRO Code)	0.5	0.6
14	Extensive sedum only green roof (does not meet the GRO Code)	0.3	0.6
15	Green facades and modular living walls (rooted in soil or with irrigation)	0.5	0.6
16	Wetlands and semi-natural open water	1.0	Open water 1.0
17	Rain gardens and vegetated attenuation basins	0.7	n/a – add as category
18	Open swales and unplanted detention basins	0.5	n/a
19	Water features (unplanted and chlorinated)	0.2	n/a
20	Open aggregate and granular paving	0.2	Sand and gravel 0.4
21	Partially sealed and semi-permeable paving	0.1	Permeable Paving 0.2
22	Sealed paving (including concrete and asphalt)	0.0	Non-permeable surfaces 0.0