

building with nature – improving the standards of GI across the UK

Gemma Jerome and **Danielle Sinnett** explain how the Building with Nature framework was developed as an aid to specifying what is meant by, and consequently delivering, high-quality green infrastructure

Green infrastructure (GI) provides multiple benefits to people and society, as evidenced in research and practice. These benefits span a range of built environment and civil society interests, including delivering health and wellbeing outcomes, enhancing provision for urban biodiversity, reducing the urban heat island effect, and supporting environmental quality and adaptation to climate change.

Academic knowledge, planning policy and good practice guidance promote GI as a priority mechanism to deliver these benefits through the planning and development system. GI is commonly defined by three critical characteristics: it is *multi-functional*, it is *connected*, and it forms part of a coherent *network*.

Much has been written about the requirements for GI features to be multi-functional, to deliver multiple benefits; for features to be accessible to optimise these benefits for people and wildlife; and for features, taken together, to form a continuous network to optimise the potential for GI to positively contribute to ecosystem services and to benefit urban environments. For example, SuDS (sustainable drainage system) features such as ponds and swales attenuate water, enhance water quality, and make provision for biodiversity and recreation.

Although the literature, policy and guidance clearly state that GI needs to be multi-functional and contribute to a connected network to be of benefit, there is less emphasis given to the fact that, to deliver these multi-functional benefits, GI has to be of high quality. Moreover, what constitutes high

quality at each stage of design, implementation and maintenance is even less clear.

This article describes the steps taken to establish a framework for more effectively specifying what is meant by high-quality green infrastructure. Ultimately, the purpose of the framework is to help those engaged in design and delivery in the built environment to more consistently secure high-quality GI in new and existing places. In the following sections, we describe how we developed the framework, and go into more detail about how we tested the Building with Nature benchmark on a number of case studies.

Framework development

The Building with Nature benchmark is underpinned by a set of 23 standards which, taken together, describe high-quality green infrastructure. The standards extend across the range of challenges and opportunities associated with the design, delivery and maintenance of GI features, particularly in the context of planning and developing sustainable, healthy and liveable places.

Within the framework, the standards are organised around thematic areas relating to optimising the functionality of individual features (for example securing the long-term management and maintenance of GI features) and relating to specific ecosystem services, including nature conservation, water management and health and wellbeing.¹ Underpinning the Building with Nature standards is a framework of principles which relates back to the

original literature, guidance or policy evidence that describes and defines high-quality GI (see Table 1).

The Building with Nature benchmark has been developed to be flexible enough for use across

different types of development, different spatial scales, and different stages of the development process.² In order to develop the standards, we worked iteratively with a range of case studies

Table 1
Building with Nature - principles

Core principles	Health and wellbeing principles	Water management principles	Wildlife principles
<p>1 Multi-functional network Ensure that individual features form and contribute to a multi-functional network of green infrastructure operating at a landscape scale.</p> <p>2 Contextual Ensure that the green infrastructure reflects the character of the local environment and positively contributes to local identity, landscape character and vernacular, and a sense of place.</p> <p>3 Policy-responsive Ensure that green infrastructure effectively meets local priorities and needs as articulated in local policy or through consultation with local stakeholders.</p> <p>4 Climate-resilient Ensure that green infrastructure is resilient to climate change, and that opportunities for shade provision, carbon storage, improved soil and air quality, and reduced noise and light pollution are maximised.</p> <p>5 Future-proofed Ensure that adequate provision is made for how green infrastructure will be managed and maintained, including the responsibility for these activities and their funding.</p>	<p>1 Accessible Ensure that all people can use, enjoy and positively contribute to green infrastructure.</p> <p>2 Inclusive Ensure that green infrastructure is designed to recognise the needs and strengths of local people, and how these may change over time.</p> <p>3 Seasonal enjoyment Ensure that green infrastructure features can be used and enjoyed at all times of year.</p> <p>4 Locally relevant Ensure that green infrastructure features are designed and located to reduce and/or prevent health inequalities in existing and new communities.</p> <p>5 Socially sustainable Ensure that green infrastructure creates a sense of social cohesion and inclusion, thereby improving community wellbeing and increasing the likelihood of social sustainability.</p> <p>6 Distinctive Ensure that green infrastructure contributes to place distinctiveness, with the aim of creating a place where people feel a sense of belonging and pride in their neighbourhood.</p>	<p>1 Quantity Ensure that green infrastructure supports the management of flood risk, and maintains and protects the natural water cycle by managing and using rainwater close to where it falls.</p> <p>2 Quality Ensure that green infrastructure positively contributes to surface water management and associated components to deliver a controlled flow of clean water.</p> <p>3 Amenity and biodiversity Ensure that green infrastructure is integrated with SuDS to enhance benefits for people and nature.</p> <p>4 Innovative Ensure that green infrastructure within the boundary of the development is used to enhance the water storage capacity of land adjacent to, or downstream from, the development.</p> <p>5 Resilient Use a diversity of green infrastructure features to enhance water quality through more and better treatment stages, thereby maximising resilience and the efficiency of pollution reduction.</p> <p>6 Locally distinctive Use water management features to create a distinct sense of place.</p>	<p>1 Bigger and better Ensure that over time green infrastructure contributes positively to reversing the long-term decline in biodiversity.</p> <p>2 More joined up Ensure connectivity between habitats within the boundary of the scheme.</p> <p>3 Locally relevant Ensure that habitat creation provides optimal conditions to reverse the long-term decline in biodiversity.</p> <p>4 Nature-rich development Ensure that space is provided for wildlife to flourish throughout the built environment.</p> <p>5 Ecological networks Ensure that green infrastructure creates and restores linkages from the development to the wider landscape.</p> <p>6 Sensitive construction Ensure that opportunities to protect and enhance biodiversity are taken during the planning and construction of new development.</p>

Case study 1 Elderberry Walk



The Elderberry Walk HAB Housing development is located on a former school site in Bristol. It includes 161 homes in a mix of tenures, including social and ethical rent. The green infrastructure of the development has been designed to fit with the local area, retaining existing trees along the boundary and integrating with the surrounding neighbourhood by providing connectivity through a spine of green space.

The design has been informed by local stakeholders and communities. A detailed management plan has been provided to ensure that benefits are secured over time. The landscaping has been designed to be low maintenance, with options for management company or community involvement.

The GI has been designed to provide a high level of connectivity between the individual features, providing multiple functions for people and wildlife. The development includes a SuDS system, with rain gardens, a swale combined with wildlife garden, and wildflower green roofs on bin and bikes stores. A mosaic of habitats is being provided: grassland habitats; trees, shrubs and hedges (with over 200 new trees); climbing plants on front elevations; edible planting in communal areas; and spaces for informal play.

To deliver on the principles for nature, lighting has been designed to be sensitive to bats and to avoid light spill into woodland areas, and gaps in fences allow hedgehog movement through the site. The design incorporates habitat creation, including for species that reflect the local context, and foraging opportunities for wildlife, and the provision of bat boxes and hedgehog shelters, along with guidance for householders. In addition, stepping stones of habitat are created with a mix of native species to increase resilience to climate change.

representing different development types and sizes, and worked with end-users to test and refine a set of principles to ensure that they are realistic.

Creating a framework of principles

The framework of principles is shown in Table 1 on the preceding page.

Once we had a draft framework, it was tested on a suite of developments in Gloucestershire and the West of England, and has just been further tested in Scotland. The case studies set out above and on the next pages provide examples of how these developments fulfilled the principles in the framework, with each example focusing on a particular theme.

Case study 2 Gloucester Services

Glenn Howells Architects



Gloucester Services is a motorway service station, completed in 2014 and designed to have a minimal impact on the surrounding landscape. The green infrastructure includes an extensive green roof, integrated SuDS with wildlife-friendly planting, and areas for play. Water quantity is controlled and managed through the integration of an interconnected system of individual SuDS components within the boundary of the services. These SuDS features have been designed to contribute to a high-quality environment for people by providing amenity value, including a children's play area and outdoor seating and paths in an attractive setting. The SuDS arrangement has also created new habitats and linkages, thereby enhancing ecological connectivity across the site.

During testing Gloucester Services developed management plans to ensure that the GI continues to support wildlife, and Building with Nature is currently being used to meet some of the desirable principles in the framework.

Case study 3 Forth Valley Royal Hospital and Larbert Woods

The partnership between NHS Forth Valley and Forestry Commission Scotland has resulted in the delivery of an exceptional medical facility within a high-quality landscape setting. Prior to redevelopment, the hospital grounds, adjacent woodland and Larbert Loch were missing opportunities to deliver multiple benefits to patients and visitors, through neglect and poor management. The site is characterised by extensive colonisation of rhododendron, prevalence of non-native species and plantation conifers, and inadequate provision for public access and water management.

The masterplan set out a sensitive renovation of the woodland, with progressive planting of native trees and under-storey shrubs to control access and highlight the footpath system and improve biodiversity. Similarly, at Larbert Loch the margins have been reinstated to wet woodland and damp meadow, providing benefits to the biodiversity and 'bio-abundance' on site, with high numbers of species now recorded.

There is an emphasis on 'little and often' in the access to smaller green courtyards and the patient and visitor gardens, with clear signage and accessible paths throughout the facility. This is coupled with a planting scheme which concentrates design principles around 'lushly-planted green spaces, each with distinctive character, seasonal interest and vertical features'. The inclusion of high-quality landscaping as a frontage to the facility encourages as many people as possible to take advantage of the opportunity to take a break and walk in the grounds. The amenity value of the woodland for a new range of beneficiaries is promoted via the Access, Health and Recreation Advisor at Larbert Woods and initiatives such as 'Branching Out', an outdoor mental health programme, and the Green Exercise Partnership.

The advantages of using principles

Based on feedback from early adopters of the Building with Nature benchmark, applying a common framework of principles early in the planning process can help to reduce planning uncertainty. This provides

reassurance across the development process: by defining how development can deliver high-quality outcomes which meet local need, the framework supports planners; and by reducing the length of time spent negotiating acceptable parameters for a

Case study 4 Chesterton Farm

Chesterton Farm is a proposed urban extension to Cirencester of 2,350 new homes and 9 hectares of employment land to be used for commercial and community facilities. The proposal includes provision for large areas of green infrastructure, including the retention of sensitive habitats and hedges to ensure that the development reflects the character of the nearby Cotswolds Area of Outstanding Natural Beauty. A detailed construction plan also sets out how impacts on these sensitive habitats will be mitigated at all stages of construction.

Health and wellbeing principles have been incorporated through a range of GI features close to homes, including formal sports and play areas and informal open space. There is a strong emphasis on access to GI for active living, and the design includes a variety of short circular routes between homes and key services, with planting selected to maintain interest all year round. The facilities, seating and other furniture, lighting and play equipment provided as part of the GI facilitate access by people with differing needs and abilities. There is a particular focus on safe access, and dementia-friendly design. Natural and conventional play areas and spaces meet European standards, and children's play areas include equipment for wheelchair users.

proposal, using the framework could represent significant cost savings for developers.

Users of the principles of Building with Nature have suggested that the framework can helpfully shape conversations on GI. It provides clarity on expectations for GI, thus helping to deliver better outcomes from the planning and design process. It also ensures the high quality of features delivered through implementation, management, maintenance and monitoring of GI as a result of residential and commercial development.

What is happening at the moment?

By clearly defining what characteristics underpin high-quality GI, Building with Nature is making a significant difference to the quality of outcomes at each subsequent stage of the GI project lifecycle. The principles are being used in planning and development to remove barriers to the delivery of high quality; from plan-making and design, through to implementation and the long-term management and maintenance of GI features.

In one example, Building with Nature is being used in parallel by a local planning authority and a planning applicant. The forward planning team are using the principles set out in the framework to shape their GI strategy, a document that will guide applicants (and other stakeholders) and which, in conjunction with the relevant Local Plan policies, will give clear guidance on expectations for GI delivery and, in particular, on the quality of that GI. Meanwhile, the team responsible for preparing the planning application are working with the principles to secure Building with Nature accreditation. This involves demonstrating that the Building with Nature standards have been achieved at each stage of the application, from the outline planning application to reserved matters applications.

In this case, the local planning authority is aware of the applicant's ambitions to achieve accreditation, and, although this outcome is not a planning condition for the scheme, the content of the Building with Nature evaluation report is being used to guide the level of detail included within design codes and to inform planning conditions that will further secure the quality of GI outlined within the scheme.

Building with Nature accreditation is being used by developers to differentiate their schemes, and to highlight to both customers and stakeholders that they are committed to delivering and maintaining high-quality liveable places. By using an independent verification scheme for GI, the developer is able to clearly demonstrate their commitment to providing a network of natural and semi-natural features to contribute to good outcomes on health and wellbeing, water management, health and safety, nature conservation, and distinctiveness of place.

● **Dr Gemma Jerome** is Visiting Fellow at the University of the West of England and Director of Building with Nature.

Dr Danielle Sinnett is Associate Professor in Green Infrastructure with the Centre for Sustainable Planning and Environments at the University of the West of England. This article was based on research carried out as part of a Knowledge Transfer Partnership funded by Innovate UK and the NERC (grant number 1011832) and an Innovation Fund funded by Natural Environment Research Council (grant number NE/N016871/1). The views expressed are personal.

Notes

- 1 For a full account of how the principles were developed, see D Sinnett, G Jerome, S Burgess, N Smith and R Mortlock: 'Building with Nature – a new benchmark for green infrastructure'. *Town & Country Planning*, 2017, Vol. 87, Oct, 427-31
- 2 For further information on how Building with Nature works in practice, see the Building with Nature website, at www.buildingwithnature.org.uk