

Garden City Standards for the 21st Century

Practical Guides for Creating Successful New Communities

guide 7

planning for green and prosperous places





Practical Guides for Creating Successful New Communities

Guide 7: Planning for Green and Prosperous Places

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**The Lady Margaret
Patterson Osborn Trust**



The TCPA is grateful to Age Niels Holstein of the Municipality of Amsterdam for the Zuidas case study set out on page 24. © Age Niels Holstein, Municipality of Amsterdam



PERFECT (Planning for Environment and Resource eFFiciency in European Cities and Towns) is a five-year project co-funded by INTERREG Europe (see <https://www.interregeurope.eu/>). The objective of PERFECT is to integrate the many benefits of green infrastructure into planning for the future of urban and rural areas. It seeks to influence the policy-making process by raising awareness of the social, environmental and economic potential of green infrastructure (see <https://www.interregeurope.eu/perfect/>).

Cover photograph of Milton Keynes courtesy of www.amazing-mk.co.uk. Since its inception, Milton Keynes has had a strong focus on incorporating green infrastructure into its development.

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The TCPA Practical Guides

Across the UK there is a shortage of housing, and it is increasingly understood that we need to plan and build new large-scale developments, in addition to renewing existing towns and villages. At the same time, many people worry that any new places built will be no more than soulless, unattractive dormitory suburbs. How can we prevent such outcomes?

How can we ensure that new large-scale developments become socially and economically successful places – places that will improve over time, and in which people will want to live for generations to come? The answer lies in the Garden City development model – a proven way of funding, creating and maintaining successful high-quality places. A true Garden City is a place created following the Garden City principles, set out in the box below.



National planning policy guidance on a range of issues has been greatly reduced, so practical advice about how to create successful new places is more important than ever. The TCPA's Practical Guides – on location and consent; finance and delivery; design and masterplanning; planning for energy and climate change; homes for all; planning for arts and culture; planning for green and prosperous places; creating health-promoting environments; and long-term stewardship – are not detailed handbooks but instead set out the scope of opportunities for ambitious councils who want to create high-quality, large-scale new developments, whether or not they are able to follow all the Garden City principles. The Guides highlight key points for consideration and offer signposts to sources of further detailed information. They are 'living' documents that will be periodically updated to reflect key policy changes. Although they are focused on policy in England, the principles and key recommendations can be applied across the UK. The Practical Guides will help anyone attempting to create great places, for everyone, whether or not they describe what they are trying to achieve as a 'Garden City'.

The Garden City principles

A Garden City is a holistically planned new settlement that enhances the natural environment and offers high-quality affordable housing and locally accessible work in beautiful, healthy and sociable communities. The Garden City principles are an indivisible and interlocking framework for delivery, and include:

- Land value capture for the benefit of the community.
- Strong vision, leadership and community engagement.
- Community ownership of land and long-term stewardship of assets.
- Mixed-tenure homes and housing types that are genuinely affordable.
- A wide range of local jobs in the Garden City within easy commuting distance of homes.
- Beautifully and imaginatively designed homes with gardens, combining the best of town and country to create healthy communities, and including opportunities to grow food.
- Development that enhances the natural environment, providing a comprehensive green infrastructure network and net biodiversity gains, and that uses zero-carbon and energy-positive technology to ensure climate resilience.
- Strong cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods.
- Integrated and accessible transport systems, with walking, cycling and public transport designed to be the most attractive forms of local transport.

The TCPA has produced an extensive set of policy and practical resources on Garden Cities, which can be found at <http://www.tcpa.org.uk/pages/garden-cities.html>

Summary

This Practical Guide is intended for anyone involved in creating a new large-scale development – whether or not it is described as a ‘Garden City’ – although it is primarily aimed at people working on Garden Cities, ‘garden towns’, and ‘garden villages’. It will be useful for councillors, planners, masterplanners, developers, architects, transport planners, business leaders, community activists, environmentalists, water companies, landscape architects, park managers, highway engineers, and all those many and varied people who will have to work together if we are to create a new generation of enduringly successful – and beautiful – new places.

The original Garden Cities were, as their name suggests, designed to be green – places in which people could live in homes with gardens, take exercise in local green spaces, and grow food. Today, the networks of street trees, parks, gardens and allotments found in the original Garden Cities would be described as ‘green infrastructure’. In the early 20th century, when the first Garden City was planned at Letchworth, the term ‘green infrastructure’ was not used, but the benefits of green urban environments were fully appreciated. Garden Cities were designed to be healthy places in which to live, unlike the rapidly expanding industrial cities that had become increasingly overcrowded, polluted, and unhealthy.

The benefits of green infrastructure

Today, the Garden City model of development is more relevant than ever. There is overwhelming research evidence demonstrating that living in green environments is good for our mental and physical health. We now know how vitally important it is to be physically active in our day-to-day lives, not least to help us combat obesity. In an era in which one-third of children leave primary school overweight – something that is likely to undermine their health for the rest of their lives – the need for high-quality parks and safe, attractive pedestrian and cycle routes has never been more pressing.

In addition, we are starting to understand how important green infrastructure is for reducing the effects of climate change. During heat waves, trees, gardens and other planted areas can measurably reduce local temperatures in urban areas. During high rainfall, tree canopies and rooting areas can reduce the flow of water into drains, helping to reduce flood risk.

Investing in good-quality green infrastructure makes sound economic sense. Its multiple benefits, including improved public health, better air quality and sustainable drainage, provide good value for money. Places with high-quality green infrastructure attract investment, skilled workers, tourists, and economic activity.

Developments with good green infrastructure do not have to be low-density suburbia. Good design, efficient use of land, and the incorporation of elements such as street trees, pocket parks, green roofs and green walls can ensure that the multiple benefits of green infrastructure can be included in every type of place, from city centres to ‘garden villages’.

In the last few years green infrastructure has attracted increasing interest from academic researchers around the world. Our ability to quantify its benefits is growing rapidly, and this is starting to influence policy and practice. This Practical Guide provides a snapshot of current thinking in the current policy context and alerts readers to new ideas and sources of information, and it sets out principles for success in planning for green infrastructure in new developments.

1

Introduction

1.1 What is green infrastructure?

Green infrastructure is central to the realisation of the Garden City principles in new development. There are a number of different, but similar, definitions of 'green infrastructure' (GI) in use. According to the European Commission:

*'Green infrastructure can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystems services and protect biodiversity in both rural and urban settings.'*¹

The National Planning Policy Framework (NPPF) defines green infrastructure as:

*'A network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.'*²

Green infrastructure can comprise a wide range of features, such as parks, gardens, green spaces, green roofs, green walls, street trees, verges along roads, meadows, wetlands, rivers, canals, and lakes. Because of the inclusion of lakes and waterways it is sometimes called 'green and blue infrastructure'. In this Practical Guide references to green infrastructure are taken to include waterways. There is general agreement that green infrastructure:

- is a **network**, not just a single site;
- operates at a **range of different scales**, for example from hedgerow to floodplain; and
- is **multi-functional** – it is designed and managed to provide a range of different benefits simultaneously.

1.2 Why does green infrastructure matter?

There is abundant research demonstrating that green infrastructure provides a range of economic, social and environmental benefits, including:

- improving people's mental and physical health;
- reducing air pollution;
- making places more attractive to investors;
- increasing property values;
- protecting against climate change – for instance by helping to reduce flood risk, storing water for droughts, storing carbon, or preventing soil erosion;
- increasing biodiversity;
- encouraging local food growing, healthy eating, and healthy food environments;
- encouraging active travel and safer roads; and
- using limited land efficiently by providing multiple benefits simultaneously.³

1 *Building a Green Infrastructure for Europe*. European Commission. European Union, 2013.

http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructure_broc.pdf

2 *National Planning Policy Framework*. Department for Communities and Local Government, Mar. 2012. Annex 2.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

3 Research demonstrating the multiple benefits of green infrastructure can be found by searching the Green Infrastructure Resource Library, hosted on the Green Infrastructure Partnership website, at <http://www.gip-uk.org>



In Vauban, part of Freiburg in Germany, the grass beneath the tram not only looks attractive but absorbs rain water and helps to moderate the temperature during hot weather

Green infrastructure is an important part of the world's 'natural capital', the resources that nature provides for us and on which our economy – and our lives – depend. Natural capital includes natural assets such as land, minerals, soils, water, air, and all living things.

The relatively new discipline of 'natural capital accounting' is starting to provide evidence of how much green infrastructure 'assets' are worth, and of how much the ecosystems services⁴ that these assets provide are worth, to society and business.⁵ This growing body of international evidence is increasingly being reflected in regulatory requirements and policy.

Some people are wary of natural capital accounting because they are concerned that it attempts to put a financial value on things that cannot – or should not – be monetarised, such as a beautiful view. However, the consequence of not putting a monetary value on natural capital has been that its worth has not been reflected in investment decisions. Nevertheless, it is important to recognise that green infrastructure often has a high cultural value that is impossible to quantify. Even places that look quite ordinary, such as footpaths, hedgerows and riversides, can be immensely important to people's sense of identity and mental wellbeing.

Despite the limitations of natural capital accounting, putting a monetary value on natural capital is starting to allow its worth to be reflected in investment decisions and to be far more evident to businesses, economists, and policy-makers.

4 The UK National Ecosystem Assessment defines 'ecosystems services' as 'the benefits provided by ecosystems that contribute to making human life both possible and worth living'. See the UK National Ecosystem Assessment's 'Concepts' webpage, at <http://uknea.unep-wcmc.org/EcosystemAssessmentConcepts/EcosystemServices/tabid/103/Default.aspx>

5 See *Demystifying Economic Valuation*. Valuing Nature Programme paper, Jun. 2016. <http://valuing-nature.net/demystifying-economic-valuation-paper>; and the GIFT-T! project's Green Infrastructure Valuation Toolkit, available at <http://www.gift-t.eu/manual/gi-business-plan/gi-valuation-toolkit>

As the Natural Capital Committee⁶ puts it:

*'Loss of natural capital is imposing significant costs on the UK economy and businesses: costs which are often not sufficiently recognised and therefore excluded from economic indicators of progress (such as GDP). However, these costs are becoming increasingly apparent in very tangible ways: flooding; degradation of soil quality; pollinator declines; air pollution; and loss of outdoor recreation areas.'*⁷

The Office for National Statistics (ONS) is working to include natural capital in the UK environmental accounts by 2020.⁸

There is, then, strong evidence that investment in green infrastructure must be made alongside investment in 'grey' infrastructure, such as roads, railways, bridges, etc. Natural solutions which provide multiple benefits simultaneously are often better value than single-purpose 'grey' infrastructure. According to the European Commission:

*'One of the key attractions of GI is its ability to perform several functions in the same spatial area. In contrast to most 'grey' infrastructures, which usually have only one single objective, GI is multifunctional which means it can promote win-win solutions or 'small loss-big gain' combinations that deliver benefits to a wide range of stakeholders as well as to the public at large.'*⁹

1.4 The role of planning

The Natural Capital Committee's *State of Natural Capital* report argues that:

*'GI needs to be fully incorporated into urban planning systems, to help avoid short termism. Building GI into long-term development plans will not only ensure its benefits from the outset, but will also avoid costly retrofitting in the future.'*¹⁰

Effective delivery of multi-functional green infrastructure depends on a co-ordinated, place-based approach which is sensitive to local needs and aspirations and the local landscape and topology. Planning for large-scale development such as Garden Cities offers a significant opportunity to plan for networks of green infrastructure. A framework for growth should be set out at the earliest stages, considering how the potential for green infrastructure can be maximised.¹¹ The NPPF and other national policy (see Section 2 of this Practical Guide) sets out the overarching framework for planning for green infrastructure, but each local planning

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- 6 The Natural Capital Committee is an independent committee set up to advise the government in England about the sustainable use of natural capital and the benefits it provides.
<https://www.gov.uk/government/groups/natural-capital-committee>
 - 7 *Improving Natural Capital – An Assessment of Progress*. Natural Capital Committee, Jan. 2017.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/585429/ncc-annual-report-2017.pdf
 - 8 For information and a range of natural capital accounting technical resources, see the ONS's 'Methodology: natural capital' webpages, at
<https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/methodologies/naturalcapital>
 - 9 *Building a Green Infrastructure for Europe*. European Union, 2013.
http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructure_broc.pdf
 - 10 *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing*. Third report to the Economic Affairs Committee. Natural Capital Committee, Sept. 2015.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516725/ncc-state-natural-capital-third-report.pdf
 - 11 Birmingham University is developing a 'Natural Capital Planning Tool' – see *Planning for Sustainable Land-Use: The Natural Capital Planning Tool (NCPT) Project*. Royal Institution of Chartered Surveyors, Nov. 2015.
<http://www.rics.org/uk/knowledge/research/research-reports/natural-capital-tool-planning-/>; and the Ecosystems Knowledge Network's 'Natural Capital Planning Tool (NCPT)' webpage, at
<http://ecosystemsknowledge.net/natural-capital-planning-tool-ncpt>



This green waterside in Milton Keynes provides a route for active travel, space for fishing and leisure, biodiversity, drainage, and lovely views

authority must ensure that its Local Plan and policies provide more detail about how this will be achieved at a local level, including locally set standards. The vision and standards for the green infrastructure expected in developments should be discussed in pre-application meetings with the developers as early in the process as possible.

Planning authorities should clearly set out what they expect in terms of the quantity and quality of green infrastructure in new developments so that the cost of providing it can be factored into the price that the developer pays for the land.

When planning for green infrastructure, the starting point should always be the existing provision across the site and beyond. The location and design of new development should be based on an understanding of what is already there – such an approach can provide an opportunity to strengthen networks of green infrastructure or improve the quality of individual elements.

During the planning process the local authority and the developers should consider how the green infrastructure will be funded and managed in perpetuity. Local authorities are increasingly reluctant to take on the responsibility for managing and maintaining new parks, street trees, sustainable drainage systems and other elements of green infrastructure, and alternative options for stewardship should be considered as early as possible. Further information on approaches to long-term management and funding are set out in the TCPA's Practical Guide on long-term stewardship.¹²

12 *Guide 9: Long-Term Stewardship*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, 2017. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

2 The policy context

2.1 EU policies

The view of the European Union (EU) is that green infrastructure should be integrated into most EU policies.¹³ It is also important for the better implementation of spatial planning tools and should be integrated into environmental impact assessment (EIA)¹⁴ and into strategic environmental assessment (SEA).¹⁵ Green infrastructure is recognised as contributing to regional policy and sustainable growth and to facilitating smart and sustainable growth through smart specialisation.¹⁶ At the time of writing it is not known how much EU policy will be retained in the UK post-Brexit.

EU Green Infrastructure Strategy

The EU Green Infrastructure Strategy advocates the full integration of green infrastructure into a wide range of policies so that it becomes a standard component of development across the European Union. The strategy recognises that green infrastructure solutions are particularly important in the urban environments in which more than 60 % of the EU population lives.¹⁷

2.2 Policy in England

The 25-year Environment Plan

In January 2018 the government published, *A Green Future: Our 25 Year Plan to Improve the Environment*,¹⁸ setting out a long-term vision for England's environment post-Brexit, along with some medium-term aspirations for progress, and some shorter-term actions. The plan is a pan-government publication, but will be overseen by the Department for Environment, Food and Rural Affairs (Defra).

The plan stresses the importance of good-quality green infrastructure and commits to creating a 'national framework of green infrastructure standards, ensuring that new developments include accessible green spaces and that any area with little or no green space can be improved for the benefit of the community'. Development of the standards is being co-ordinated by Natural England, and they are due to be published in 2019. The plan suggests that the new national standards will, eventually, be underpinned by more detailed locally set standards.

13 *Supporting the Implementation of Green Infrastructure. Final Report.* European Commission, May 2016.

http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/GI%20Final%20Report.pdf

14 *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.* European Commission, 2013. <http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf>

15 *Ibid.*

16 *Green Infrastructure (GI) – Enhancing Europe's Natural Capital.* COM(2013) 249 final. European Commission, May 2013.

http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/1_EN_ACT_part1_v5.pdf

17 *Ibid.*

18 *A Green Future: Our 25 Year Plan to Improve the Environment.* HM Government, Jan. 2018. <https://www.gov.uk/government/publications/25-year-environment-plan>



Community gardens encourage people to learn to grow food, get active, and make new friends

The plan also says that the government intends to strengthen and improve planning policy concerning biodiversity 'net gain' in developments, and concerning the creation and maintenance of sustainable drainage systems (SuDS).

Biodiversity Strategy for England and the National Pollinator Strategy

The Biodiversity Strategy for England¹⁹ sets out how EU commitments are to be achieved. The National Pollinator Strategy sets out a ten-year plan to help bees and other pollinators flourish, in urban as well as rural areas.²⁰

The National Planning Policy Framework

The National Planning Policy Framework²¹ is the overarching planning policy framework for the whole of England. Local Plans prepared by councils must conform to it. It identifies sustainable development as the purpose of the planning system and lists a number of 'core planning principles', including:

- 'always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings' (para. 17) and refuse permission for 'development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions' (para. 64);
- 'take account of the different roles and character of different areas, promoting the vitality of our main urban areas, protecting the Green Belts around them, recognising the intrinsic character and beauty of the countryside and supporting thriving rural communities within it' (para. 17);

19 *Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems Services*. Department for Environment, Food and Rural Affairs, Aug. 2011. <https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services>

20 *The National Pollinator Strategy: for Bees and Other Pollinators in England*. Department for Environment, Food and Rural Affairs, Nov. 2014. <https://www.gov.uk/government/publications/national-pollinator-strategy-for-bees-and-other-pollinators-in-england>

21 *National Planning Policy Framework*. Department for Communities and Local Government, Mar. 2012. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

- 'contribute to conserving and enhancing the natural environment and reducing pollution' (para. 17);
- 'encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions (such as for wildlife, recreation, flood risk mitigation, carbon storage, or food production)' (para. 17).

With regard to climate change risks, the NPPF states (in para. 99) that:

'When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through sustainable adaptation measures, including through the planning of green infrastructure.'

Section 11 of the NPPF says that the planning system should protect and enhance valued landscapes; recognise the wider benefits of ecosystems services; and minimise impacts on biodiversity and provide net gains in biodiversity.

Importantly, para. 114 of the NPPF states that local planning authorities should:

'set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure;'

Given that networks of biodiversity and green infrastructure are not confined to local authority administrative boundaries, strategies should be prepared in collaboration with adjacent planning authorities under the 'duty to co-operate'.

Planning Practice Guidance

The 'Natural environment' section of Planning Practice Guidance (PPG)²² notes the importance of green infrastructure as a key consideration in Local Plans and development decisions, and includes cross-references to other sections of the guidance, reflecting its multi-functionality. It states (in para. 028) that:

'Green infrastructure is important to the delivery of high quality sustainable development, alongside other forms of infrastructure such as transport, energy, waste and water. Green infrastructure provides multiple benefits, notably ecosystems services, at a range of scales, derived from natural systems and processes, for the individual, for society, the economy and the environment. To ensure that these benefits are delivered, green infrastructure must be well planned, designed and maintained.'

Locally-Led Garden Villages, Towns and Cities

In 2016 the Government published *Locally-Led Garden Villages, Towns and Cities*,²³ a prospectus that encouraged expressions of interest from local authorities that wanted to build new large-scale communities. The prospectus made it clear that these new places should include accessible green space close to homes and should be based on the Garden City principles.

22 'Natural environment'. Planning Practice Guidance. Department for Communities and Local Government. <https://www.gov.uk/guidance/natural-environment>

23 *Locally-Led Garden Villages, Towns and Cities*. Department for Communities and Local Government, Mar. 2016. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508205/Locally-led_garden_villages__towns_and_cities.pdf

3 Funding and maintenance



Well maintained green infrastructure usually becomes increasingly valuable as time goes by. For instance, a newly planted landscape with young trees and limited biodiversity provides far less in terms of ecosystems services than one with mature trees, hedgerows, wetlands, rich biodiversity, and the ability to absorb large volumes of rainfall. However, the value of green infrastructure improves only if it is well maintained. If it is not, it can become a liability instead of an asset. For instance, a green wall that is left to dry out will no longer provide the cooling and insulation it was designed to achieve, will not support biodiversity, but will become an eyesore. Consequently, when planning green infrastructure it is vital to consider, from the earliest stage:

- **revenue** funding – to pay for the care of the green infrastructure in perpetuity;
- **capital** funding – to pay for creating the green infrastructure; and
- the **design** of the green infrastructure – which will affect the cost of maintaining it as well as the cost of creating it.

The design of the green infrastructure will, in part, determine how easy or difficult it is to maintain, and how much the maintenance will cost. The design will also determine the various functions that the green infrastructure will achieve – and this could, in part, help secure funding for its maintenance. For instance, if a public park or roadside verge is designed to include SuDS so that it contains water during times of high rainfall,²⁴ it could be possible to make a business case to the local water company so that it would contribute to the running costs.

24 See *Designing for Exceedance in Urban Drainage – Good Practice*. CIRIA, 2006.
https://www.ciria.org/Resources/Free_publications/Designing_exceedance_drainage.aspx



Beam Parklands, in Dagenham, East London, was funded from a range of sources, including European regional development funding, to support local economic growth

A key part of the Garden City model of development is that the new settlement should be set up to be well maintained in perpetuity, and that mechanisms for funding and managing the maintenance should be considered before the place is built. Further information on approaches to long-term management and funding are set out in the TCPA's Practical Guide on long-term stewardship.²⁵ Planning and creating green infrastructure is a long-term project, and if it is to be successful it will need to survive political and policy changes, and will need to work across different funding and budget cycles.

3.1 EU financial instruments

Various EU financial instruments can be used to help create and improve green infrastructure. The Regional Development Fund and the Rural Development Fund, for instance, provide a wide range of tools that can be used to enhance spatial connectivity and restore natural ecosystems across the wider countryside. They can also be used to support the economic diversification of land uses and the creation of multi-functional land use areas which are based on maintaining natural ecosystems.²⁶

In England, the EU Regional Development Fund is administered by central government using advice given by local enterprise partnerships (LEPs), many of which may be unaware of the economic value of green infrastructure. It is likely that LEPs will continue to play a central role in distributing regional economic development funds in England post-Brexit, and LEPs should be seen as an important potential source of funding for green infrastructure. The increasing evidence of the economic value of green infrastructure should be used to create a strong business case to demonstrate the value of investing in it.

25 *Guide 9: Long-Term Stewardship*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, 2017. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

26 *Green Infrastructure*. European Commission, 2010. <http://ec.europa.eu/environment/nature/info/pubs/docs/greeninfrastructure.pdf>. At the time of writing it is not known for how long UK projects will be eligible for this funding

4 Principles for success

This Practical Guide is aimed primarily at those planning new, large-scale developments such as Garden Cities, 'garden towns', and 'garden villages'. The principles set out here are therefore focused on planning green infrastructure as part of new developments, although they are relevant more widely too. More detailed guidance on developing the planning approach is given in Section 4 of the TCPA's *Planning for a Healthy Environment – Good Practice Guidance for Green Infrastructure and Biodiversity*.²⁷

Principle 1:

Green infrastructure should be at the heart of the long-term vision for the place

Creating a new Garden City or other large-scale settlement is a very long-term process that will involve a wide range of people and organisations over many years, so it is vital to have a clearly articulated vision describing what is to be achieved. To ensure that green infrastructure is integrated throughout the development, at all levels, over several decades, the overarching vision for the new place should be one in which green infrastructure is central. Green infrastructure should be developed in a way that maximises the opportunities provided by other policy, such as economic development, water quality, public health, transport, tourism, and education.

Principle 2:

The character and functionality of the landscape in which the new place will be built should be fully understood

A landscape-led approach should be taken to masterplanning,²⁸ informed and inspired by a landscape character assessment.²⁹ Areas and networks of ecological value should be identified, protected, and enhanced. Improving existing green infrastructure is usually quicker and less expensive than starting from scratch, and can help to create a sense of place early in the development. Natural systems such as water catchment areas should be understood and their functionality increased where possible, for instance through SuDS.³⁰ The site appraisal should include the quality and distribution of soil, and planting should reflect the analysis and findings. Importing high-quality soil from outside the site should be avoided.

Ecosystems such as water catchment areas or biodiversity corridors usually extend far beyond site boundaries, and the masterplan should ensure that drainage systems and paths link with local networks, such as the National Cycle Network³¹ or canal and river towpath

27 *Planning for a Healthy Environment – Good Practice Guidance for Green Infrastructure and Biodiversity*. TCPA, Jul. 2012. <https://www.tcpa.org.uk/good-practice-guidance-for-green-infrastructure-and-biodiversity>

28 Further guidance on masterplanning is set out in *Guide 3: Masterplanning and the Garden City Design Ethic*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Oct. 2017. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

29 See 'Landscape and seascape character assessments'. Webpage. Natural England and Department for Environment, Food and Rural Affairs, Oct. 2014. <https://www.gov.uk/guidance/landscape-and-seascape-character-assessments>

30 For comprehensive guidance about SuDs, see *SuDS Manual*. CIRIA, 2007 (updated Nov. 2105). http://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

31 See Sustrans' 'National Cycle Network' webpages, at <https://www.sustrans.org.uk/ncn/map/national-cycle-network>



At Barton Park, Oxford, new hedgerows have been laid before the homes are built so that they will be established by the time people move in, helping to create a sense of place and increase biodiversity

networks.³² This will probably require the planning authority to work with adjacent planning authorities under the 'duty to co-operate'.

Principle 3:

Green infrastructure will be successful only if a wide range of partners collaborate

The strategic planning, implementation and management of green infrastructure requires a co-ordinated approach from a multi-disciplinary, cross-organisational team of partners. This is likely to include councils, businesses,³³ landowners and land managers, and voluntary organisations.³⁴ Within councils, the local public health team should be involved to maximise the potential for creating a place in which it is easy to live a healthy life.³⁵ Transport planners

32 See, for instance, see the Canal & River Trust's canal and river network map, at <https://canalrivertrust.org.uk/enjoy-the-waterways/canal-and-river-network>

33 See, for instance, *Liverpool BIDs Green Infrastructure Plan Background*. Mersey Forest Team, for Liverpool City Central and Commercial District Business Improvement Districts, Apr. 2017. <http://www.merseyforest.org.uk/our-work/green-infrastructure/liverpool-bids-green-infrastructure-plan/>

34 See, for instance, the catchment-based approach (CaBA) to delivering improvements to Water Framework Directive catchments in England, involving a wide range of partners – see <https://www.catchmentbasedapproach.org/about>

35 Further guidance on planning for public health is set out in *Guide 8: Creating Health-Promoting Environments*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Oct. 2017. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

and highways engineers should be involved. Strategies for transport and for water and drainage should be developed alongside the green infrastructure strategy so that links can be made between them. For instance, green infrastructure can contribute to meeting traffic management and safety aims.³⁶ Ecologists, leisure managers and park managers should contribute. As the new settlement is inhabited the community should be involved to ensure that the green infrastructure provision meets their needs. Voluntary groups such as 'friends of parks' should be encouraged: they can contribute to the development, management, and, to some extent, maintenance of the new green spaces.³⁷

Principle 4:

The masterplan should be supported by a green infrastructure strategy that includes governance and funding mechanisms

The green infrastructure strategy should provide an overarching framework that sets out how the existing green infrastructure will be protected and enhanced and how new elements will be created. Landscape interventions such as tree planting or the creation of wetlands take many decades to mature, so it should be a long-term strategy, but updated at intervals and flexible enough to accommodate change. It should include an assessment of the likely maintenance costs of the green infrastructure over time and how they will be funded. It should set out a governance framework which includes the organisations and expertise that will be necessary to create a high-quality multi-functional network that meets the needs of the new community.³⁸ Organisations should formally agree to deliver their part of this as early as possible. The strategy and governance structure should ensure that the people and organisations that will contribute to the creation and development of the green infrastructure are able to work in a co-ordinated way, to create a single multi-functional network rather than a range of disparate, single-purpose elements. Where possible, the network should align with strategies for surrounding areas to ensure that the local green infrastructure contributes to larger networks.

Principle 5:

The strategy should be supported by a maintenance plan or plans

The developer should ensure that there is a maintenance plan for each element of the green infrastructure, and that it is clear who is responsible for implementing it, particularly after the developer has completed the project and left the site. Different elements of the green infrastructure will require different plans: for instance, a SuDS scheme will have technical maintenance needs to ensure that it keeps functioning, whereas a community green space will need a holistic park management plan of the sort required by the Green Flag Award scheme.³⁹ Natural features and habitats often need to be maintained at specific times of the year or in phases (for instance, wildflower meadows might need to be cut at a specific point in their growth), and the maintenance plan should make this clear.

36 For details about the potential for trees to contribute to traffic management and safety, see *Trees in Hard Landscapes: A Guide for Delivery*. Trees and Design Action Group, Sept. 2014 http://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_trees-in-hard-landscapes_september_2014_colour.pdf

37 The National Federation of Parks and Green Spaces is the umbrella organisation for 'friends of parks' groups – its website, at <https://www.natfedparks.org.uk/>, contains useful resources

38 Further information on governance structures is set out in *Built Today, Treasured Tomorrow – A Practical Guide to Long-Term Stewardship*. TCPA, Jan. 2014. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

39 See *Raising the Standard: The Green Flag Award Guidance Manual*. Green Flag Award, 2016. <http://www.greenflagaward.org.uk/how-it-works/>



Principle 6:

Green infrastructure should be designed and managed to be multi-functional

Individual sites – and whole networks – of green infrastructure should be designed and managed to provide multiple benefits simultaneously. For example, a single green space can provide recreation, urban cooling, food-growing, and biodiversity. A green infrastructure network could provide active travel opportunities, wildlife corridors, biodiversity, reduction in air pollution, and water quantity and quality management. The design of footpaths and building foundations should accommodate the presence tree roots, to maximise tree growth and sustainable drainage. The management of green infrastructure should reflect its many benefits – for instance, the same space might need to be managed for biodiversity, play, and drainage.

Principle 7:

New developments should increase biodiversity

Existing designated sites and irreplaceable habitats of international, national and local significance should be protected from development – and enhanced if they are in a poor condition. In addition, habitats and features should be created, restored, connected and managed for biodiversity to create a ‘net gain’ in biodiversity after the development has been completed.⁴⁰

40 Para. 109 of the National Planning Policy Framework says that planning should provide net gain in biodiversity where possible. *National Planning Policy Framework*. Department for Communities and Local Government, Mar. 2012.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Principle 8:

Diverse types of green spaces should be provided and the whole community should be encouraged to use them

To maximise the health and economic benefits of green infrastructure, a range of interconnected green spaces should be created (including small local places close to where people live); allotments and places to grow food; linear 'green corridors' for walking and cycling to schools and other facilities; natural play areas; and large open spaces for big events. Where appropriate, seats, litter bins, and toilets should be provided to encourage the old, young, and frail to use the space.⁴¹ Efforts should be made to make sure that people know about their local green spaces by including them on pedestrian signposts, in tourist guides, on websites, and in information packs for new residents (the Ordnance Survey provides free digital maps of all green spaces⁴² to encourage people to find and use their local green spaces).

Support for local green infrastructure should be gained by explaining its functions and value to users – for instance, if a park is designed to flood so that it holds water during times of high rainfall, this should be explained. Green infrastructure should be designed with a view to achieving relevant standards, such as the Green Flag Award standard.

Principle 9:

When new places are planned, the quantity, quality, accessibility and distribution of green infrastructure should be carefully considered and local targets should be set

Local policies should set out clear expectations for the quantity and quality of green infrastructure so that developers can factor the cost of providing it into the price they pay for land.

Quantity

As a general rule, 50% of the land total in a new Garden City should be green infrastructure, including private gardens and green roofs, and this should be clearly stated in local planning policy. For comparison, eco-towns were expected to have 40% green infrastructure; Hampstead Garden City has 60%;⁴³ and London aims to increase its green infrastructure to more than 50%.⁴⁴

Natural England's Accessible Natural Greenspace Standard (ANGSt) provides a framework for assessing the provision and distribution of green space based on area.⁴⁵ However, green infrastructure is not just green space. One method of planning for the quantity of multiple types of green infrastructure in a new development is to use the 'Green Space Factor' – a way of calculating green space requirements for new development.⁴⁶ Another valuable

41 Further guidance on planning for public health is set out in *Guide 8: Creating Health-Promoting Environments*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Oct. 2017. <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

42 See the OS Greenspace resource, at <https://www.ordnancesurvey.co.uk/getoutside/greenspaces/>

43 See *The Essential Role of Green Infrastructure: Eco-towns Green Infrastructure Worksheet*. TCPA, Sept. 2008. <https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=dd06b21d-6d41-4c4e-bec5-4f29a192f0c6>

44 *London Environment Strategy. Draft for Public Consultation*. Mayor of London. Greater London Authority, Aug. 2017. https://www.london.gov.uk/sites/default/files/8314_gla_les_online_single_page.pdf

45 See the archived Natural England 'Accessible Natural Greenspace Standard (ANGSt)' webpage, at http://webarchive.nationalarchives.gov.uk/20140605111422/http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandardangst.aspx; and 'Nature Nearby'. *Accessible Natural Greenspace Standard Guidance*. NE265. Natural England, Jan. 2010. <http://webarchive.nationalarchives.gov.uk/20140605145320/http://publications.naturalengland.org.uk/publication/40004?category=47004>

46 A Kruuse: *The Green Space Factor and Green Points System*. GRaBS Expert Paper 6. TCPA, Apr. 2011. <http://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=ffa13e5f-01fe-4aaa-8524-d2b20157651e>

measurement that could be included in a local policy is tree canopy cover.⁴⁷ A balance should be struck between green infrastructure that only provides natural ecosystems services and green infrastructure that also provides 'cultural' ecosystems services – in other words, opportunities for leisure and play. Green walls, for instance, do not provide space for kids to run around. There are, then, a lot of variables to consider, and local planning policy should be clear about exactly what is included in the local target.

Quality

There is currently no nationally recognised standard for assessing the multi-functional quality of green infrastructure, although this is a rapidly emerging field of research and development. The 'Building with Nature'⁴⁸ standard, being trialled in the South West of England, provides one solution. For public parks and other green leisure spaces the Green Flag Award⁴⁹ provides a holistic framework for assessing the standard of public green spaces. Developers should ensure that new parks are designed, and their management structures set up, with a view to achieving the Green Flag Award standard.

Accessibility and distribution

Evidence shows that good, accessible local green spaces can reduce health inequalities, but it is often the case that the green spaces in poorer areas are smaller and/or of worse quality than elsewhere.⁵⁰ Consequently, when planning a new place it is important to ensure that all parts of the development have easy access to good-quality local green spaces and other green infrastructure.⁵¹

Principle 10:

Green infrastructure should be monitored and evaluated to see whether it is providing the benefits intended

If green infrastructure is well planned, designed and managed it should improve as it matures and provide an increasing amount of benefit. However, whether or not this is happening, and whether it is providing a good return on investment, can only be known if its performance is monitored from the start. Baseline data should be collected at the earliest stage to inform progress. Monitoring might include assessing biodiversity, public health benefits, water retention, tree canopies,⁵² urban cooling, etc. It could be carried out by a range of different people or organisations, such as academics, ecologists, hydrologists, and/or public health experts.⁵³ If elements of the green infrastructure are under-performing as a result of poor maintenance, this should be addressed when the maintenance plans are updated.⁵⁴ If a more substantial change is required, this could be reflected in the periodic updates to the overarching strategy and investment plans.

47 For ways of assessing this and other benefits provided by trees, see the i-Tree Ecotool, available at <https://www.itreetools.org/eco/>

48 See the Building with Nature website, at <http://www.buildingwithnature.org.uk>

49 See the Green Flag Award website, at <http://www.greenflagaward.org.uk/>

50 *Local Action on Health Inequalities: Improving Access to Green Spaces*. Health Equity Briefing 8. Public Health England/UCL Institute of Health Equity, Sept. 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/355792/Briefing8_Green_spaces_health_inequalities.pdf

51 *Urban Green Spaces: A Brief for Action*. World Health Organization, Regional Office for Europe, Jan. 2017. <http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2017/urban-green-spaces-a-brief-for-action-2017>

52 For monitoring the benefits of trees, see the Forestry Commission's 'i-Tree Eco in the UK' webpage, at <https://www.forestry.gov.uk/fr/itree>

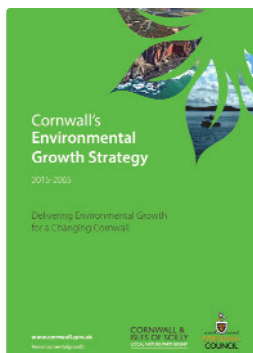
53 Further information on monitoring and evaluation is set out in *Urban Green Spaces: A Brief for Action*. World Health Organization, Regional Office for Europe, Jan. 2017. <http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2017/urban-green-spaces-a-brief-for-action-2017>

54 See, for example, *Waterways & Wellbeing: Building the Evidence Base. First Outcomes Report*. Canal & River Trust, Sept. 2017. <https://canalrivertrust.org.uk/about-us/outcomes-of-our-work>

5 Case studies

5.1 Cornwall's Environmental Growth Strategy

A pioneering strategy linking green infrastructure and economic growth and involving a wide range of partners over many years



Cornwall's identity is defined by its location in South West England and unique environment, and this is vital to the area's long-term social, environmental and economic resilience. There is recognition across the private and public sectors that protection of the environment has not been enough to prevent continued degradation or to reverse damage already being caused. Recognising this, Cornwall Council is one of the first councils in the UK to develop and commit formally to an Environmental Growth Strategy alongside public and private sector partners. The strategy sets out a high-level vision, objectives, and formal commitments that span both the council and private sector business. It is intended to inform and improve strategic investment in Cornwall's environment. It also provides a framework for stakeholders and partners to work more effectively together. It has already been incorporated in the Local Plan and the Strategic Economic Plan for Cornwall, helping to provide a strong steer for future development quality and impact.

The plan is framed over a 50-year period, recognising that environmental growth and change requires long-term planning and commitment. It seeks to secure a net gain of natural systems in Cornwall rather than just protecting what remains. The strategy sets out four key ambitions, consisting of experiencing, understanding and valuing Cornwall and achieving environmental growth. The document sets out ten target outcomes that draw on these ambitions, together with the indicators against which the successful delivery of the strategy will be measured.

The success of any strategy of this nature extends beyond normal political or business planning timescales, so it is essential that the concepts and outcomes are founded on strong support across sectors and endorsed at a high level from the outset. The production of the strategy is just the start and has provided a catalyst and long-term action plan for wider change across the council's policies as well as practical projects, for example Green Infrastructure For Growth, which is changing the approach to the maintenance of open spaces. There are also practical and inclusive resources to help a wide range of organisations and individuals deliver environmental growth.

Further information:

<http://www.cornwall.gov.uk/grow-nature>

5.2 Bicester's green infrastructure planning toolkit

Developing a toolkit to help plan and evaluate green infrastructure

Bicester, in Oxfordshire, is expanding rapidly – it will double in size over the next 15 years. The local planners at Cherwell District Council want to build high-quality multi-functional green and blue infrastructure into the new developments, so they need tools to optimise the type of infrastructure created in each location. Yet many potential tools require extensive training or are not yet widely available. The council is therefore working with the University of Oxford to identify tools for planning and evaluating the benefits of green infrastructure that are suitable for use by local authorities with limited time and resources.

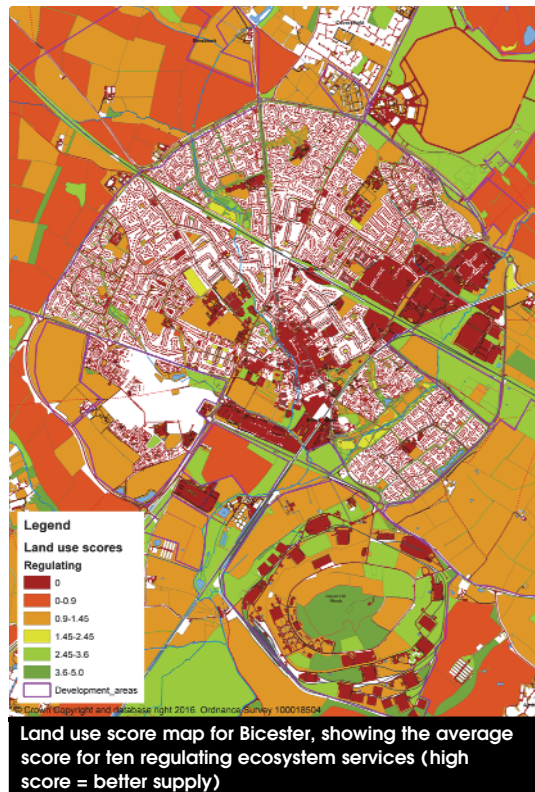
The focus is on quick and simple approaches, starting with land use scoring based on the ability of different land use types to provide ecosystem services. This can be used to map the supply of different services, in order to identify hotspots that should be protected and gaps where services can be enhanced. The maps should be verified using local knowledge, by consulting the public and local experts. Public engagement through methods such as workshops or online mapping is also vital to assess

cultural ecosystem services such as aesthetic value and recreation. Scoring can be used to assess individual sites, multiplying the scores by land use areas to generate a total score before and after development. This can be used to compare alternative plans and to indicate whether there is a net gain in services. The Natural Capital Planning Tool⁵⁵ being developed by Birmingham University is being used to test this approach.

The team is also testing tools to design connected networks for wildlife and people, linking the existing town with the new developments and the countryside beyond, as well as tools to evaluate the benefits of green infrastructure, such as iTree-Eco,⁵⁶ BeST (Benefits of SuDS Tool),⁵⁷ and the Green Infrastructure Valuation Toolkit.⁵⁸ The aim is to compile a toolkit that can be used by other local authorities in the UK.

Further information:

<http://www.eci.ox.ac.uk/news/2015/1211-greeninfrastructure.html>



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55 *Planning for Sustainable Land-Use: The Natural Capital Planning Tool (NCPT) Project*. Royal Institution of Chartered Surveyors, Nov. 2015. <http://www.rics.org/uk/knowledge/research/research-reports/natural-capital-tool-planning-/>; and the Ecosystems Knowledge Network's 'Natural Capital Planning Tool (NCPT)' webpage, at <http://ecosystemsknowledge.net/natural-capital-planning-tool-ncpt>

56 See the Forestry Commission's 'i-Tree Eco in the UK' webpage, at <https://www.forestry.gov.uk/fr/itree>

57 The susDrain BeST (Benefits of SuDS Tool) tool is available at <http://www.susdrain.org/resources/best.html>

58 The GIFT-T! project's Green Infrastructure Valuation Toolkit is available at <http://www.gift-t.eu/manual/gi-business-plan/gi-valuation-toolkit>

A 'Healthy New Town' 'where London meets the Garden of England'

Ebbsfleet Development Corporation

Edible Ebbsfleet is a project to support local residents in growing fruit and vegetables in streets, parks and gardens to make fresh food easily available and fun

Ebbsfleet Garden City is the largest of the ten 'Healthy New Town' pilots that NHS England is supporting to help plan and build healthier places. It is being developed collaboratively by Ebbsfleet Development Corporation and Dartford, Gravesham and Swanley Clinical Commissioning Group. Edible Ebbsfleet is a project that works with, and supports, local residents to develop a series of small-scale food-growing initiatives along local streets, parks and gardens, both to transform the image of the area and to promote education about the health benefits of eating fresh fruit and vegetables.

The existing communities adjacent to Ebbsfleet Garden City have health indices over 30% lower than the national averages, including a high incidence of childhood obesity and adult type 2 diabetes. Edible Ebbsfleet will help local people to take control of their own health outcomes by making healthy eating fun. Through food growing, residents will be encouraged to get involved, to grow, to cook, to eat healthily, and to get to know their neighbours.

Building on the success of Incredible Edible Todmorden, the Ebbsfleet Healthy New Town Team have worked with a local voluntary sector organisation, No Walls Gardens, to kick off the initiative with modest financial support for a series of ten planting locations. These come together to create the first 'edible streetscape', along London Road, Northfleet. The edible streetscape provides free access to fruit, vegetables, and herbs. Tomatoes, kohlrabi, cucumbers, pak choi, potatoes, sage, garlic and beans hang from baskets, or grow in planters, along the high street and in small parks. The planting surprises and delights, and passers-by are encouraged to pick, share, take home and cook the food.

The ambition of Edible Ebbsfleet is for such streets to become the norm across the Garden City. Further phases include planting fruit and vegetables at Ebbsfleet International station, and a healthy growing and eating education programme within existing and new schools. Ultimately, the programme aims to become self-sustaining, with developers and community activists picking up the mantle.

Further information:

Edible Ebbsfleet: <http://ebbsfleetdc.org.uk/healthynewtowns/>

NHS Healthy New Towns: <https://www.england.nhs.uk/ourwork/innovation/healthy-new-towns/>

No Walls Gardens: <http://www.nowallsgardens.org/>

Incredible Edible Todmorden: <https://www.incredible-edible-todmorden.co.uk/>

Accommodating street trees in heavily used urban areas

Creating a new Garden City often provides an opportunity to retrofit green infrastructure into existing urban areas that are included in, or adjacent to, the new development as part of the wider new green infrastructure network. Street trees provide valuable ecosystems services, but incorporating them into urban areas with heavy traffic and complex underground infrastructure is technically difficult and can be resisted by highways engineers. An ambitious regeneration scheme in Goldhawk Road, Hammersmith, West London, demonstrates that it is possible to retrofit street trees to provide sustainable drainage and other ecosystems services benefits in the most challenging of contexts.

Specially engineered tree pit systems and permeable paving were introduced to reduce flood risk, both locally and in the wider area. The tree pits are designed to provide space for the trees' roots to grow, and also to hold large volumes of water during times of high rainfall. In addition, the structure of the tree pit system prevents traffic from compacting the soil, which would inhibit tree growth. However, providing large root volumes in a dense urban environment requires foresight and creativity.

The landscape architects, Robert Bray Associates, specified the GreenBlue Urban StrataCell modular load-bearing matrix tree pit system. The flexibility of the system enables the incorporation of regular- or irregular-shaped tree pit configurations, maximising the available root space without compromising traffic surfaces. The use of these underground solutions avoids soil compaction. By providing enough space for the roots, the tree should flourish, and the canopy created by its branches will be maximised. This, in turn, will help to slow the water flow into the drainage system below. The tree pits are irrigated by the road run-off, and the water is stored within the extensive root zone provided by the StrataCells, which are filled with a specific SuDs-compatible tree pit soil. There is a flow-controlled discharge into a combined sewer. The use of trees as part of the wider SuDs network in this scheme demonstrates the importance of an integrated approach to both green and blue infrastructure when evaluating new regeneration and highways schemes. The borough is investigating the use of smart sensors to fit to tree pits in order to monitor similar SuDs schemes.

This £3.8 million investment should improve air quality and drainage, making a more resilient and attractive environment.

Further information:

<http://www.greenblue.com/gb/case-study/goldhawk-road/>

Incorporating biodiversity in new developments

Nature is in trouble, and new developments can help if they are planned with nature in mind. We need new places to be good for both people and wildlife, resulting in healthy, nature-rich communities. At Kingsbrook, a new development of 2,450 new homes to the east of Aylesbury, Barratt and David Wilson Homes North Thames (BDWNT), the RSPB and Aylesbury Vale District Council are working to create a nature-friendly development that sets the benchmark that they wish to see commonly in place in future developments. The RSPB helped BDWNT to develop their designs prior to submission for planning, including collaboration on a green infrastructure design code. This is part of a national agreement which includes guidance to help Barratt Developments Plc incorporate nature-friendly features throughout its operations.

Kingsbrook's villages will contain:

- 60% green space, including parks, orchards and a nature reserve;
- wildlife corridors along hedges, wildflower verges, and hedgehog highways;
- sustainable drainage – grassy swales, detention basins, and ponds;
- plants chosen for wildlife – native trees and hedges, wildflower meadows, and fruit trees; and
- wildlife homes, from integrated bird boxes to frog hibernation spots.

By June 2017 the first 102 homes were built and occupied. Nature-friendly show-home gardens were created with signs to showcase the features and engage residents. Small copper butterflies have been seen in the gardens and little egrets and dragonflies on the new swales. Several new homeowners have said that the nature-friendly ethos attracted them to buy. 'We are delighted with the partnership and progress so far at Kingsbrook,' said Jo Alden, Technical Director at Barratt Homes. 'The wildlife features are cost effective and make a real difference. The biggest change is just encouraging people to think about things a bit differently.'

RSPB scientists will monitor how wildlife responds – and people benefit – for 15 years. The intention is to set nature-friendly standards that can be affordably reached in all housing developments, including mainstreaming the viability of products such as 'swift bricks'.⁵⁹

Further information:

<http://www.kingsbrook-aylesbury.co.uk/>

⁵⁹ In autumn 2016, following close working between Barratt Developments, the RSPB and Action for Swifts, Manthorpe Building Products launched a new integral 'swift brick', providing safe, habitable spaces for swifts – <http://manthorpebuildingproducts.co.uk/product/gswb-swift-nest-brick>

Smart green roofs on office buildings – a public-private collaboration

Breevast

Green roof on top of the Breevast office in Zuidas, Amsterdam

The Zuidas ('South Axis') area of Amsterdam in the Netherlands has become a successful international financial and business district, home to international corporations and finance company headquarters. The aim is to reinforce its position as a commercial centre and remain attractive to the business community by making it a better place for people who work in, live in and visit the district.

To steer the growth of the area the city council has adopted a planning policy called the Zuidas Vision, which prioritises green infrastructure and will be used to encourage and co-ordinate private and public development to extend and improve greenery and water, enhancing its connectivity and accessibility.

In addition, to adapt to increasing rainfall Amsterdam has adopted a city-wide Amsterdam Rainproof Programme. This promotes the smart use of water and increased greenery in public and private spaces. Linked to the programme, businesses in the Zuidas area have formed the Zuidas Green Business Club, which promotes nature-based solutions and has launched an initiative to create 25,000 square metres of green roofs by 2020.

The green roofs will store stormwater and reduce sewer overflow. Their 'smart' design enables the micro-management of water flows. The benefits of the green roofs include a reduction in the urban heat island effect, improved energy efficiency in buildings, increased biodiversity, and improvements to air quality. The smart green roofs will create multiple benefits, giving opportunities for urban agriculture, leisure, and recreation. They have been created in partnership by the private and the public sectors, with community involvement and engagement. The result will be a 270 hectare water-resilient and climate-adaptive financial and business district.

Further information:

Zuidas Vision (with a summary in English): <https://www.amsterdam.nl/zuidas/visie-zuidas/>

Zuidas Green Business Club Zuidas: <http://greenbusinessclub.nl/zuidas/>

Rainproof Amsterdam: <https://www.rainproof.nl/>

6

Sources of further information

TCPA publications and resources

Planning for a Healthy Environment Good – Practice Guidance for Green Infrastructure and Biodiversity

<https://www.tcpa.org.uk/good-practice-guidance-for-green-infrastructure-and-biodiversity>

Garden City Standards for the 21st Century: Practical Guides for Creating Successful New Communities

Guide 1: Locating and Consenting New Garden Cities (2017)

Guide 2: Finance and Delivery (2017)

Guide 3: Masterplanning and the Garden City Design Ethic (2017)

Guide 4: Planning for Energy and Climate Change (2016)

Guide 5: Homes for All (2016)

Guide 6: I'd Love to Live There! Planning for Culture and the Arts (2016)

Guide 7: Planning for Green and Prosperous Places (2017, revised 2018)

Guide 8: Creating Health-Promoting Environments (2017)

Guide 9: Long-Term Stewardship (2017)

Canal & River Trust

Charity protecting 2,000 miles of waterways in England and Wales. Publishes an e-planning toolkit for waterways.

<https://canalrivertrust.org.uk/about-us/planning-and-design>

CIRIA

Construction Industry Research and Information Association. Publishes *The SuDS Manual*.

<https://www.ciria.org>

European Commission

Publishes green infrastructure studies and other publications.

http://ec.europa.eu/environment/nature/ecosystems/studies/index_en.htm

Green Infrastructure Partnership

National network, free to join, that shares information about green infrastructure and aims to influence key decision-makers about its value. Publishes the Green Infrastructure Resource Library, a free searchable database of research and resources.

<http://www.gip-uk.org>

Groundwork

Working through local Groundwork trusts, provides training and creates jobs to reconnect people with nature and transform neighbourhoods.

<https://www.groundwork.org.uk>

Incredible Edible Network

Rapidly growing network of places using small changes to transform communities using local food. Provides advice about setting up new groups.

<http://incredibleediblenetwork.org.uk/>

Landscape Institute

Chartered body for the landscape profession, including landscape planners, architects, and managers.

<https://www.landscapeinstitute.org/>

The Land Trust

Charity that owns and manages open space for community benefit. Its vision is to improve the quality of people's lives by creating sustainable high-quality green spaces that deliver environmental, social, and economic benefits.

<http://thelandtrust.org.uk>

The Mersey Forest

A growing network of woodlands and green spaces across Cheshire and Merseyside.

<http://www.merseyforest.org.uk/>

Natural England

Government agency with responsibility for green infrastructure.

<https://www.gov.uk/government/organisations/natural-england>

NHS Forest

Project to improve the health and wellbeing of staff, patients and communities through increasing access to green space on or near NHS land. Run by the Centre for Sustainable Healthcare.

<http://nhsforest.org/>

One Planet Council

Voluntary organisation supporting planning and development within ecological means.

<http://www.oneplanetcouncil.org.uk/>

RSPB

National nature conservation charity that owns and manages nature reserves.

<https://www.rspb.org.uk/>

Sustrans

Charity that works to make it easier for people to walk and cycle.

<https://www.sustrans.org.uk>

Trees and Design Action Group

Network that raises awareness of the value of trees in the built environment and publishes guides and resources.

<http://www.tdag.org.uk>

The Wildlife Trusts

Organisation that inspires people about the natural world and saving, protecting and standing up for wildlife and wildplaces, through 47 local trusts.

<http://www.wildlifetrusts.org/>

The Woodland Trust

Organisation that protects and campaigns on behalf of woods, planting trees, and restoring ancient woodland for the benefit of wildlife and people.

<https://www.woodlandtrust.org.uk/>