Green Infrastructure Guidance

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NATURAL ENGLAND

Contents

Figures

Cover image: Natural England. Unless otherwise stated, other images are supplied by LUC

Acknowledgements

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Foreword

Welcome to Natural England's Green Infrastructure Guidance. The Guidance articulates our position in relation to green infrastructure planning and delivery, which is increasingly recognised as an essential part of sustainable spatial planning. This is due in no small part to the role of green infrastructure as a 'life support system', able to deliver multiple environmental functions, and to play a key part in adapting to and mitigating climate change.

The landscape in and around England's cities, towns and villages is rich and varied, valued for its character, biodiversity and the opportunities it affords for public access and recreation. The housing and economic growth agenda, together with the effects of climate change, means that green infrastructure is increasingly important – but also under great pressure.

Now more than ever before, we must plan positively for green infrastructure and ensure its delivery. This Guidance is an important step in that direction. It succinctly sets out the importance of green infrastructure and the drivers for it, as well as the key environmental functions and the socio-economic benefits of the green infrastructure approach. It articulates the importance of early planning for green infrastructure and integrating green infrastructure strategies within spatial planning. It also focuses on how delivery can be achieved.

Natural England looks forward to applying the Guidance in its work in advising on and facilitating green infrastructure planning, and to working with local authorities, developers and other key partners as they deliver green infrastructure as a central feature of all our communities.

Andrew Wood

Executive Director Evidence and Policy

Section 1

Purpose and Scope of Natural England's Green Infrastructure Guidance

Purpose and Scope of Natural England's Green Infrastructure Guidance

Welcome to Natural England's Green Infrastructure Guidance. If you are a Natural England officer, this guidance will help you to:

- work with local authority and other partners to explain, promote and support green infrastructure strategic planning and delivery; and
- understand how green infrastructure relates to Natural England's wide remit and its strategic objectives.

If you are developer, planner, or a decision maker in the environmental, social or economic sectors and need to understand green infrastructure, this guidance is also for you.

Background and context

The provision of green infrastructure in and around urban areas is now widely recognised as contributing towards creating places where people want to live and work. The concept of green infrastructure is embodied in the Government's Planning Policy Statements (PPS) 1 and 12. It is an essential component of good planning for urban and rural areas, particularly in the face of climate change.

However, increased awareness of the importance of green infrastructure does not always go hand in hand with a full understanding of what it is, the range of benefits it can deliver and how it can be promoted and delivered through existing policies and process.

This guidance provides a comprehensive overview of the concept of green infrastructure and signposts to other relevant information such as Natural England's green infrastructure definition, policy statement and track record in driving delivery. It also maps out wider policy priorities and drivers for green infrastructure.

Using the Guidance, Natural England will drive forward green infrastructure planning and delivery. In particular, the Guidance will help to:

- Facilitate a co-ordinated and consistent approach to green infrastructure strategies;
- Support colleagues and guide external partners in the effective delivery of sustainable green infrastructure;
- Promote the contribution of green infrastructure to 'place-making', in addition to other government agendas and links to spatial planning;
- Inspire through best practice examples and case studies of green infrastructure planning and delivery
- Demonstrate that green infrastructure adds hugely to the value of plans and projects through the delivery of multiple benefits which other conventional 'grey infrastructure' solutions may not be able to offer;

- Highlight key issues and considerations at each level (national, regional, sub-regional, local) and links between them.

This Guidance expands on Natural England's 'Housing Growth and Green Infrastructure' Policy Position Statement (2008)[1]. It is based on the work that our staff have been doing over the past few years to promote and support green infrastructure strategies and delivery.

Structure of the Guidance

This guidance comprises three further sections:

- **What is Green Infrastructure?** This section covers the definition of green infrastructure and Natural England's role. It also clarifies the distinction between planning for open space and green infrastructure and identifies the policy support for green infrastructure;

- **The value of planning for Green Infrastructure**. This considers the functions and benefits of green infrastructure and the links to related concepts such as place-making;

- **Delivering Green Infrastructure effectively**. This addresses the role of green infrastructure strategies and how to embed green infrastructure in plan making and in the development management processes.

Section 2

What is green infrastructure?

What is green infrastructure?

Natural England's definition of green infrastructure

'Green Infrastructure is a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features. It should be designed and managed as a multifunctional resource capable of delivering those ecological services and quality of life benefits required by the communities it serves and needed to underpin sustainability. Its design and management should also respect and enhance the character and distinctiveness of an area with regard to habitats and landscape types.

Green Infrastructure includes established green spaces and new sites and should thread through and surround the built environment and connect the urban area to its wider rural hinterland. Consequently it needs to be delivered at all spatial scales from sub-regional to local neighbourhood levels, accommodating both accessible natural green spaces within local communities and often much larger sites in the urban fringe and wider countryside.'

Signpost:
Natural England's green infrastructure definition clearly relates to the definitions within Planning Policy Statement 12 (PPS12): Local Spatial Planning and within the Eco Towns Worksheet. The definition in PPS12 states that:

'Green infrastructure is a network of multi-functional green space, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities'.

The Ecotowns Worksheet defines green infrastructure as follows:

Green Infrastructure refers to a strategically planned and managed network of green spaces and other environmental features vital to the sustainability of any urban area.

Green Infrastructure also encompasses river systems and coastal environments (these are sometimes also refer to as Blue Infrastructure).

It should be noted that the English regions also have their own definitions of green infrastructure, embodied in their Regional Spatial Strategies.

A green infrastructure typology:

Parks and Gardens – urban parks, Country and Regional Parks, formal gardens
Amenity Greenspace – informal recreation spaces, housing green spaces, domestic gardens, village greens, urban commons, other incidental space, green roofs
Natural and semi-natural urban greenspaces - woodland and scrub, grassland (e.g. downland and meadow), heath or moor, wetlands, open and running water, wastelands and disturbed ground), bare rock habitats (e.g. cliffs and quarries)
Green corridors – rivers and canals including their banks, road and rail corridors, cycling routes, pedestrian paths, and rights of way
Other - allotments, community gardens, city farms, cemeteries and churchyards

Green infrastructure is especially relevant to the housing and economic growth agendas (particularly the Growth Areas and Growth Points) and to the regeneration of urban areas. Here green infrastructure is about development going hand-in- hand with the protection and enhancement of existing environmental assets and the creation of new ones. It's about putting the environment right at the centre of the planning process and producing a strategic and linked, multifunctional network of spaces with benefits for people and wildlife. It's also about underpinning the sustainability of a town or city, including making it resilient to the effects of climate change and enabling local authorities to meet their duty to conserve biodiversity under the Natural Environment and Rural Communities Act (NERC) 2006.

Green infrastructure also relates to the rural environment. In the wider countryside, green infrastructure is often viewed at a larger scale, encompassing large country or regional parks; extensive habitats, major landscape features such as river corridors and flood meadows landscapes, and the identification of wide green corridors and ecological networks. Green infrastructure at this scale can provide the wider framework and context for planning green infrastructure at a more local level.

Green infrastructure – a potted history

The evolution of green infrastructure, some key milestones and the involvement of Natural England and its predecessors, are set out below.

1970s - Seminal texts by landscape architects Ian McHarg[2] (Design with Nature) and Nan Fairbrother[3] (New Lives, New Landscapes): ideas for strategic landscape planning to deliver multiple functions, and for enhancing the peri urban environment (key tenets of what has become the green infrastructure approach).

1990s - Green infrastructure was identified in the United States as a strategic, multi-scale approach to land conservation and land use planning, with particular emphasis on 'life support functions' of natural processes or ecosystems. In England, the Community Forest programme was established in 1990 by the then Countryside Commission as a pilot project to demonstrate the potential contribution of environmental improvement to economic and social regeneration. Community Forests have since become significant green infrastructure assets.

1995 - English Nature published accessible greenspace in towns and cities - a review of appropriate size and distance criteria[4]. This was the foundation of the Accessible Natural Greenspace (ANGST) standards.

2000 - The Countryside Agency and Groundwork in the 'Countryside in and around Towns' vision document set out the key benefits of the green infrastructure approach.

2003 – The Sustainable Communities agenda: Natural England's involvement was centred on the Growth Areas in the South East including developing, in partnership, the Milton Keynes South Midlands Green Infrastructure Guide. This work also extended to on-the-ground demonstration projects across the Growth Areas. 2003 also saw the formation of the Thames Gateway and Greening the Gateway Partnership; green infrastructure was increasingly recognised as a key contributor to sustainable development.

2006 - The Growth Point Agenda: The Growth Points identified by Government in 2006 (with further growth points added in 2008) have the preparation of a Green Infrastructure Strategy by Local Authorities and their partners as one of their core conditions for the delivery of sustainable development. Natural England must be consulted in drawing up such strategies. The establishment of Natural Economy North West also occurred in 2006. This was a partnership established between Natural England, the North West Regional Development Agency and the SITA Trust. The partnership's primary aim was to build the economic case for green infrastructure.

2008 - Eco Towns Worksheet (2008)[5] published by the Town and Country Planning Association (TCPA) and written by Natural England. PPS12: Local Spatial Planning was also published in 2008, providing a national policy 'hook' for green infrastructure.
The East London Green Grid secured the President's Award and the Strategic Landscape Planning Award at the Landscape Institute Awards in this year.

The distinction between planning for open space (Open Space or Green Space Strategies, based on Planning Policy Guidance 17 or PPG17 type audits) and planning for green infrastructure

Sometimes the distinctions can appear subtle, as all green spaces can form part of green infrastructure networks, although the scope of open space strategies and green infrastructure strategies are quite different. Green Space strategies[6] work within the typology of recreational, amenity and public open spaces identified by *PPG17: Planning for Open Space, Sport and Recreation (2002)*[7]. They evaluate publicly accessible open space provision within these typologies at the local authority scale, noting issues in relation to condition, quality and access, often to inform a strategy and action plan that sets out future management and regeneration policies. They form a complementary strategy to Local Rights of Way Improvement Plans.

This guidance draws a distinction between planning for green infrastructure and open/green space strategies in the following terms:

- Green infrastructure goes beyond the site specific, considering also the 'big picture' – landscape context, hinterland and setting, as well as strategic links of sub regional scale and beyond;
- Green infrastructure considers private as well as public assets;
- Green infrastructure provides a multifunctional, connected network delivering ecosystem services;
- Whilst PPG17 compliant studies consider typologies beyond sports and amenity greenspace, spaces are considered primarily from access, quality and management perspectives, rather than consideration of wider environmental benefits and services. These green spaces are, however, important constituents of a green infrastructure network.

Policy support for green infrastructure

As part of the approach to more sustainable living and climate change adaptation, in addition to planning properly for community greenspace, green infrastructure is increasingly recognised not just as a *'nice to have, but also as a must have'* [8]. This is reflected in various aspects of national planning policy.

Planning Policy Statement 1 (PPS1) – *Delivering sustainable development* (2005)[9] states that development should ensure an appropriate mix of uses, including the incorporation of green space.

Planning and Climate Change – *Supplement to PPS1* (2007)[10] states that spatial strategies and any development should help deliver, amongst other things, green infrastructure and biodiversity as part of a strategy to address climate change mitigation and adaptation.

PPS12: Local Spatial Planning (2008)[11] requires local planning authorities to assess green infrastructure requirements. It notes in para 4.8 that:

'.. core strategies should be supported by evidence of what physical, social and green infrastructure is needed to enable the amount of development proposed for the area, taking account of its type and distribution. This evidence should cover who will provide the infrastructure and when it will be provided. The core strategy should draw on and in parallel influence any strategies and investment plans of the local authority and other organisations.'

PPS12 also notes that:
'Good infrastructure planning considers the infrastructure required to support development, costs, sources of funding, timescales for delivery and gaps in funding.... The infrastructure planning process should identify, as far as possible:

- *infrastructure needs and costs;*
- *phasing of development;*
- *funding sources; and*
- *responsibilities for delivery'.*

Natural England should utilise existing national planning policy, which promotes green infrastructure, as a 'hook' to ensure development plans incorporate policies and objectives which support green infrastructure.

SIGNPOST – other relevant national planning policy:
A number of other planning policy statements are also relevant in relation to green infrastructure. These include **PPS7: Sustainable Development in Rural Areas** (which has an emphasis on landscape character conservation and enhancement); **PPS 9: Biodiversity and Geological Conservation; PPS 25: Planning and Flood Risk; and PPS 22: Renewable Energy.**

SIGNPOST – The Climate Change Act:
The Climate Change Act became law in 2008. One of the key provisions of the Act is for the Government to report on climate change adaptation at minimum 5 yearly intervals, noting the risks brought by climate change and mitigation measures to put in place. The Act also confers the requirement on public bodies and statutory undertakers to undertake climate change risk assessments and to plan for addressing those risks. Further information can be found at http://www.defra.gov.uk/ENVIRONMENT/climatechange/uk/legislation/provisions.htm

SIGNPOST – The Local Democracy Bill:
The Local Democracy, Economic Development and Construction Bill was published by Government in December 2008. Of particular relevance to green infrastructure is the provision within the Bill to implement recommendations for economic development and regeneration, and to strengthen the role of local authorities in this context.

Green Infrastructure: Natural England's roles

Natural England currently plays several important roles. These include:

- Advisory: Helping national, regional and local bodies to deliver green infrastructure through their policies, plans and operational practices.
- Advocacy: Using every opportunity at every level to promote the essential need for green infrastructure. Recent national examples are the preparation, with the Town and Country Planning Association, of the Eco Towns Worksheet, and the publication of Natural England's Policy Position Statement on Housing Growth and Green Infrastructure (2008)[12] .
- Facilitating: Playing a central role in the establishment of regional and local partnerships convened to promote and deliver green infrastructure.
- Statutory consultee: In scrutinising plans and policies looking for opportunities to secure new green infrastructure or to improve existing networks.
- Regulation: Taking full advantage of other regulations to achieve green infrastructure benefits, for example the Conservation (Natural Habitats) Regulations and in relation to Sites of Special Scientific Interest (SSSIs).
- Delivery: The power to provide funding to implement Higher Level Stewardship (HLS) agri environment schemes (landscape and access enhancement) can play an important part in green infrastructure delivery.

More information on Natural England's role in spatial planning and development management (development control) is set out in **section 4.**

Contribution of green infrastructure to Natural England's objectives

Natural England's *Strategic Directions* document (2008)[12], outlines four major strategic outcomes for Natural England, all of which can be partly delivered through high quality green infrastructure, as outlined in table 2.1.

In respect of the natural environment, green infrastructure contributes to the responsibilities of local authorities; for example Habitat Regulations Assessments and the statutory duty conferred on local authorities with regard to biodiversity (through the Natural Environment and Rural Communities Act, or NERC). As such the green infrastructure approach is useful in joining up with a variety of other environmental management and control processes.

Table 2.1 : Contribution of green infrastructure to Natural England's strategic outcomes

Natural England's Strategic Outcomes	Contribution of Green Infrastructure
1. A healthy natural environment: ■ Our diverse landscapes continue to provide inspiration and enjoyment for people and enable our wildlife to adapt to the challenges of the future. ■ Our rich biodiversity thrives across the landscape, with ecosystems and habitats resilient to climate change. ■ Our marine environment is better understood, valued and protected.	Well planned Green Infrastructure encompassing new and enhanced sites and habitats: ■ contributes to high quality and accessible landscapes benefiting people and wildlife; ■ plays an essential role in maintaining and enhancing the health of the natural environment and its ability to provide a wealth of 'ecosystem services'; ■ increases ecological connectivity to overcome habitat fragmentation and increase the ability of the natural environment to adapt to climate change; and ■ in coastal locations helps to provide recreational space and to enhance and protect our marine environment.
2. People are inspired to conserve and value the natural environment: ■ People fully understand and value the contribution of the natural environment to our quality of life. ■ People increasingly take action to protect and enhance the natural environment ■ People have places to access and enjoy a high quality natural environment	The creation and enhancement of green infrastructure helps to: ■ create attractive and accessible places for people to enjoy direct and regular contact with the natural environment; ■ strengthen links between urban areas and their surrounding countryside, and ■ bring the natural world into every neighbourhood, with benefits for individual and community health and well-being. Twinned with effective promotional campaigns, green infrastructure can support healthier lifestyles by providing green routes for walking and cycling, and green spaces for exercise and play.

Natural England's Strategic Outcomes	Contribution of Green Infrastructure
3. Sustainable use of the natural environment: ■ Land is used for social and economic development in a way that recognises, protects and enhances the value of the natural environment. ■ Land is managed in a way that delivers environmental services alongside other benefits. ■ The use and management of the marine environment is more sustainable.	A multifunctional green infrastructure can boost the capacity of a local environment to accommodate sustainable development and provide a wide range of environmental, social and economic benefits: ■ green infrastructure supports the efficient management of water resources. A network of green spaces reduces the likelihood of flooding by allowing water to permeate through the ground; ■ green infrastructure can also be designed to act as flood storage areas, holding large volumes of water in temporary ponds to protect built up areas from flooding; ■ green infrastructure can also contribute to delivery of sustainable land management e.g. through Higher Level Stewardship (HLS) schemes; ■ green infrastructure can also create a range of social and economic benefits, both directly (through employment in capital projects and future management) and indirectly (increased visitors and visitor spend).
4. Decisions that collectively secure the future of the natural environment: ■ Our vision for the natural environment shapes future thinking and decisions at an international, national, regional and local level. ■ Future challenges for the natural environment are identified and transformed into opportunities for conservation and enhancement. ■ The natural environment is resilient in the face of climate change.	Green infrastructure helps to secure our environmental future by: ■ ensuring the efficient use of land through a multifunctional approach to land use planning; ■ supporting functioning ecosystems and robust natural systems for the management of basic resources such as water, clean air, soil, and the maintenance of biodiversity; ■ delivering a broad range of ecosystem services and linked social and economic benefits that clearly demonstrate the relevance of the natural environment to the lives and livelihoods of individuals and communities; ■ making a direct contribution to the climate changing 'proofing' of peoples' homes and communities; ■ enhancing the self sufficiency of communities though providing local food production and recreational areas.

Section 3

The value of planning for green infrastructure

The value of planning for green infrastructure

This section demonstrates how green infrastructure contributes to spatial planning and sustainability objectives, the functions it fulfils, with a concise identification of resulting benefits in relation to Government policy priorities. Related concepts such as 'multifunctionality' and the place-making agenda are also defined.

The functions of green infrastructure

Table 3.1 overleaf shows the key environmental functions of green infrastructure (in the left hand column). It also shows how the functions of green infrastructure give rise to a number of important benefits in relation to national government policy priorities.

SIGNPOST:
The policy priorities in table 3.1 are similar to the 'three principal agendas' for green infrastructure which have been identified by Natural Economy North West[13] , a partnership between Natural England and the North West Development Agency. The functions in table 3.1 represent a simplified version of the 11 benefits of green infrastructure 'interventions' identified by Natural Economy Northwest.

Figure 3.1 A single site can fulfil multiple environmental functions - Gillespie Park, North London (Image: LUC)

Policy priorities								
	Economic	Environmental					Social	
	Economic growth and employment	Protect and enhance cultural heritage	Protect and enhance the landscape, geodiversity and natural environment	Biodiversity conservation and enhancement	Climate change mitigation and adaptation	Promoting sustainable transport and reducing the need to travel by car	Community cohesion and life long learning; volunteering	Healthy communities; health and well being
Access, recreation, movement and leisure	■	■				■	■	■
Habitat provision and access to nature		■	■	■	■		■	■
Landscape setting and context for development	■	■	■				■	■
Energy production and conservation	■				■			
Food production and productive landscapes	■	■	■		■	■	■	■
Flood attenuation and water resource management	■		■	■	■			■
Cooling effect	■		■		■			■

Table 3.1: Green infrastructure and policy priorities

An example of how an individual green infrastructure component (in this case a sustainable drainage system or SuDs) can fulfil various functions is set out below. It must be recognised that some of these functions depend on the quality of the design of the green infrastructure.

SuDS attenuation pond

→ Policy priorities: Environmental; Economic; Social

→ Functions: Flood attenuation and water resource management Access, recreation, movement and leisure; Landscape setting and context for development; Habitat provision and access to nature; Healthy communities, health and well being

Figure 3.2: Green infrastructure elements, policy priorities and green infrastructure functions

Place -making

The concept of place-making (also referred to as 'place-shaping') is embedded in Planning Policy Statement 1 (PPS1), but also in Natural England's spatial targeting work. 'Place-making' means recognising the character and distinctiveness of different locations and ensuring that policies and programmes respond accordingly. Central to place-making is the realisation that the quality and management of neighbourhoods, streets and parks are directly related to civic pride, community and civic values or perceptions, and identity.

Green infrastructure can play a key part in this process, from formulation of design principles which respond to landscape character, vernacular and sense of place, and in identifying opportunities for community involvement in projects through design and implementation to foster ownership and involvement. An holistic understanding of the landscape and environmental setting and sensitivities as they relate to green infrastructure is critical to understanding character and place – a bespoke response to landscape and townscape. An understanding of place is therefore crucial to a sustainable approach to the plan-making process, and this is developed in **section 4.**

Place-making principles have been embodied in a number of recent green infrastructure strategies such as the one prepared for Thetford Growth Point[14] and the draft Ashford Green and Blue Grid Strategy[15]. The Ashford strategy takes forward the Greater Ashford Development Framework Masterplan, setting out a series of overarching high level principles and more detailed illustrative landscape and design 'visions' for key growth areas.

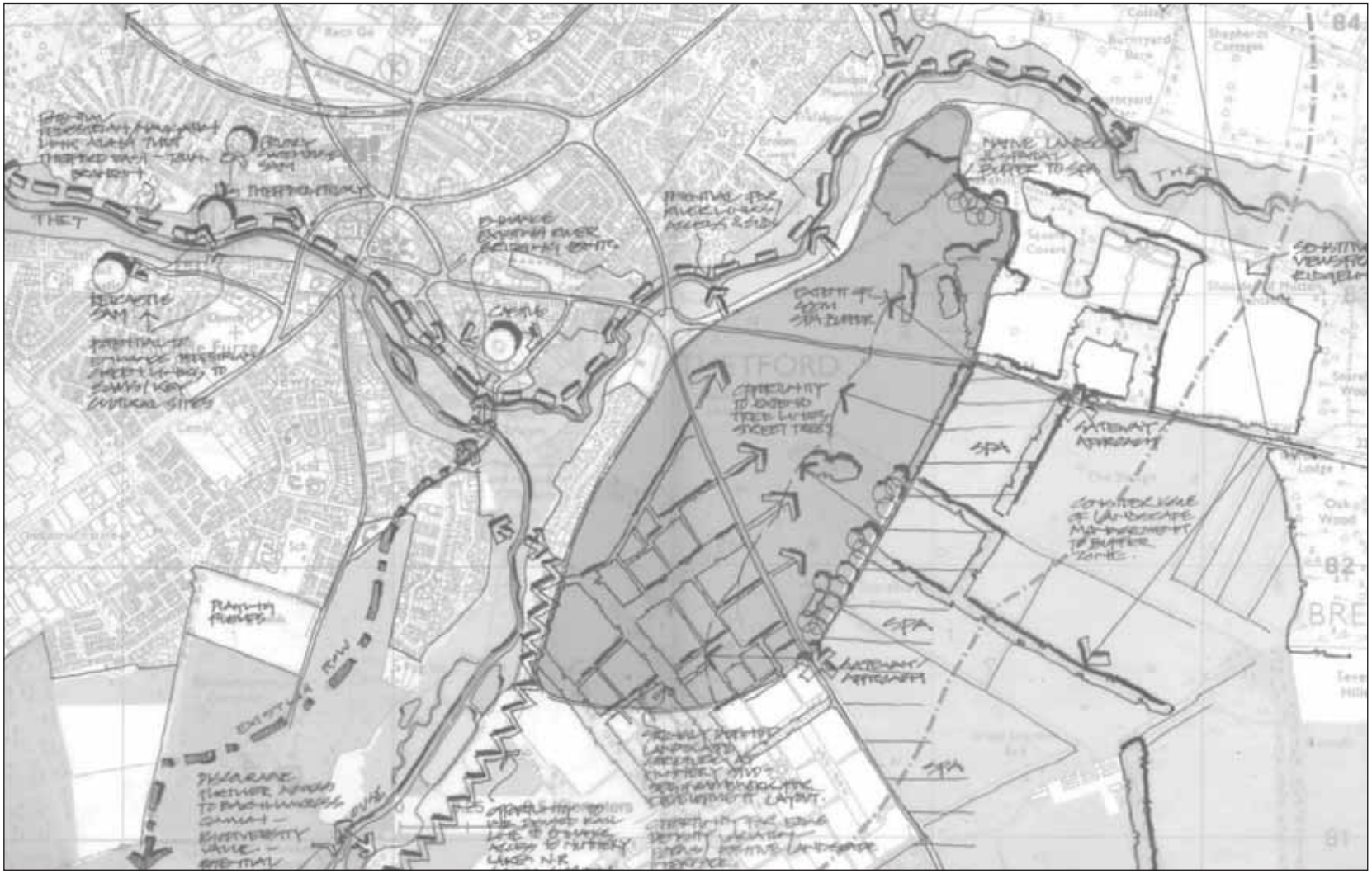


Figure 3.3 Responding to place – extract from the sensitivity analysis for Thetford Growth Point showing how landscape and visual issues informed the planning of green infrastructure (Breckland Council/LUC)

SIGNPOST:
The European Landscape Convention (ELC) [16] seeks to embody the protection of landscapes in law.

The ELC defines landscape as '...an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. The ELC recognises the multifunctional value of our landscapes and that landscape is the 'integrating medium' for land use planning. It seeks to consider landscapes from the outset in plan-making, which is fully consistent with the green infrastructure approach.

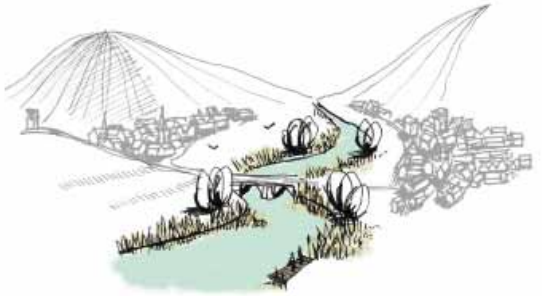
Through provision of landscape character and place orientated design principles, green infrastructure can contribute to achieving the objectives of the Convention and related tools such as landscape character assessments and landscape strategies. As such, a green infrastructure approach can assist in delivering landscape visions and guidelines, and landscape quality objectives. Recognition of landscape character is a core part of Natural England's Landscape Policy, as defined in its Landscape Policy Position Statement[17].

Retrofitting and creation of green infrastructure elements can contribute to the landscape strategies and landscape visions often contained within landscape character assessments, and therefore to delivery of the objectives of the European Landscape Convention (ELC). Other elements of green infrastructure planning, such as education and public participation, are also consistent with the aims of the ELC.

Figure 3.4: Green infrastructure should deliver landscape character enhancement, restoration or re-creation (Bedfont Lakes, West London. Image: LUC)

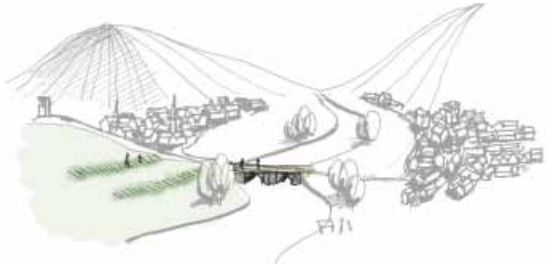
Multifunctionality

'Multifunctionality' is central to the green infrastructure concept and approach. It refers to the potential for green infrastructure to have a range of functions, to deliver a broad range of ecosystem services. Multifunctionality can apply to individual sites and routes, but it is when the sites and links are taken together that we achieve a fully multifunctional green infrastructure network. **Figure 3.5** demonstrates how one site or location can provide a variety of green infrastructure functions.

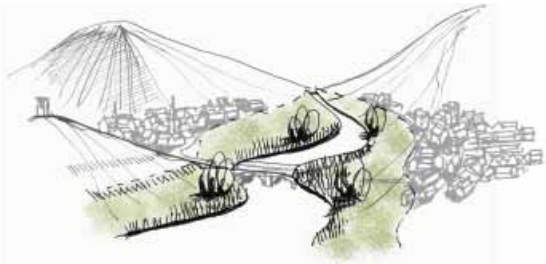


Habitat provision and access to nature

Access, recreation, movement and leisure



Landscape setting and context



Flood attenuation and water resource management

Figure 3.5: Multifunctionality

A green infrastructure approach involves considering different development layouts and densities to provide usable space and deliver meaningful opportunities for multiple functions. **Figure 3.6** shows a commonly adopted approach to greenspace provision in development in the 1960s and 1970s (the 'fitted carpet complex' [18]), with a comparative lack of usable greenspace with anything more than a purely visual function. **Figure 3.7** shows how variation in density and layout provides the opportunity for a range of green infrastructure functions, including formal and passive recreation, habitat provision and flood attenuation, and water management through use of Sustainable drainage systems (SuDS).

Many of the components of green infrastructure, such as parks, play and public art, also relate directly to **place-making** and enhancing local character. At a wider scale green infrastructure can contribute to local identity and landscape character, as illustrated in some of the case studies later in this section.

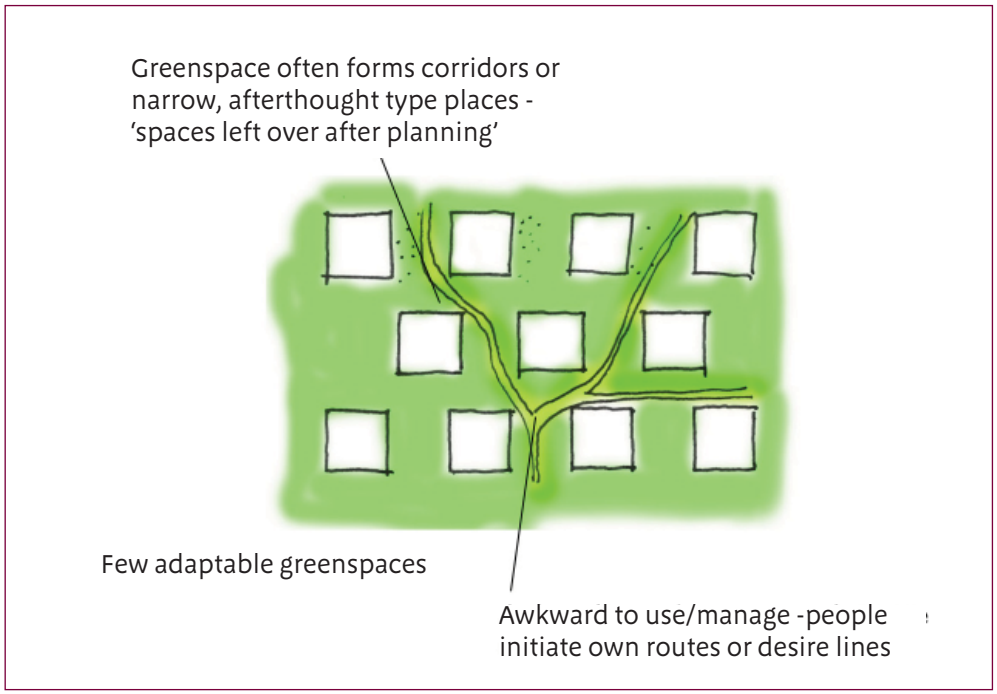


Figure 3.6: The 'fitted carpet complex' or 'Spaces Left Over After Planning' – 1970s greenspace planning

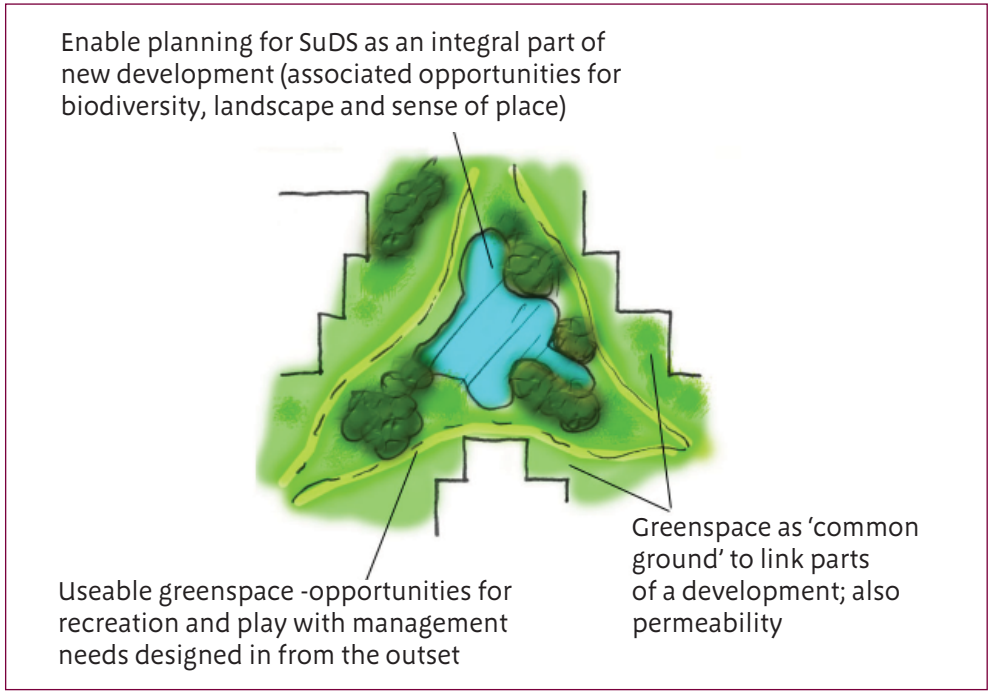


Figure 3.7: Variation in development layouts (same basic footprint) to provide opportunities for multifunctionality and more meaningful landscape spaces – the green infrastructure approach

Adaptation and retrofitting to provide multiple functions

There may be significant opportunities to retrofit green infrastructure in urban environments. These can be realised through:

- green roof systems and roof gardens;
- green walls to provide insulation or shading and cooling;
- swales integrated as part of streetscape and traffic calming schemes, or neighbourhood play areas;
- new tree planting or altering the management of land associated with transport corridors (e.g. management of verges to enhance biodiversity).
- De- canalisation of river corridors which is another significant opportunity to enhance landscape character and biodiversity.

The illustrative before and after sketches at **Figure 3.8** show an example of retrofitting green infrastructure in an established high density environment (Arundel Square in Islington, North London). A terrace of Georgian houses faced a small park, adjacent to a railway line in cutting, with an industrial estate beyond. Demolition and redevelopment of the industrial estate for flats provided the opportunity, through a Planning Obligation, to bridge the railway line and create a greatly expanded central greenspace – a new urban square.

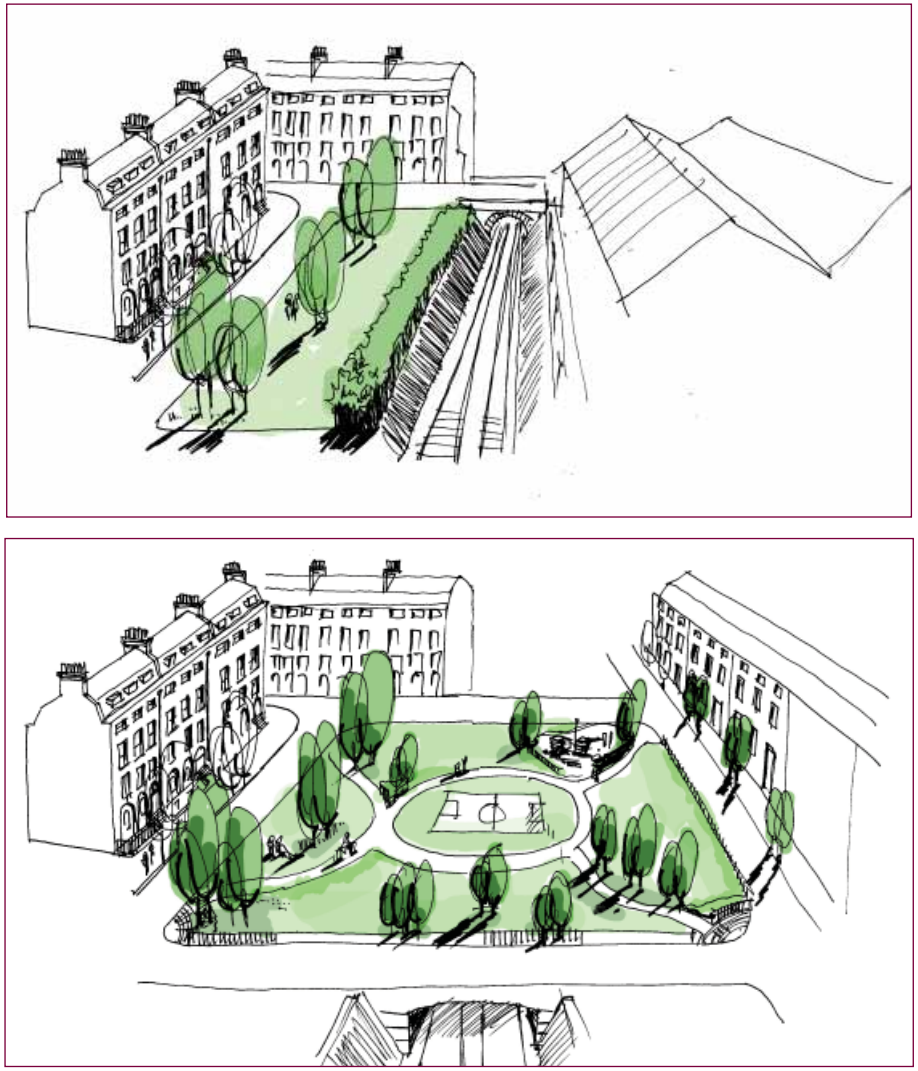


Figure 3.8: Schematic before and after illustrations of the principles embodied in the Arundel Square development

Whilst it is desirable for green infrastructure components to be immediately available 'on the doorstep' of every community, this may not always be practical in reality, particularly if 'retro fitting' green infrastructure into established high density urban environments. If creative design solutions such as those prepared for Arundel Square are not possible within the inner city, we must look further afield and to the rural hinterland to provide green infrastructure, e.g. further along river systems to deliver flood storage. Where this is the case careful consideration must be given to physically linking those outlying green spaces to communities deep within the existing town or city.

Some of the ideas set out above are illustrated in **Figures 3.9 and 3.10** overleaf, which combine the concepts of multifunctionality and place-making to illustrate the considerable potential of the green infrastructure approach.

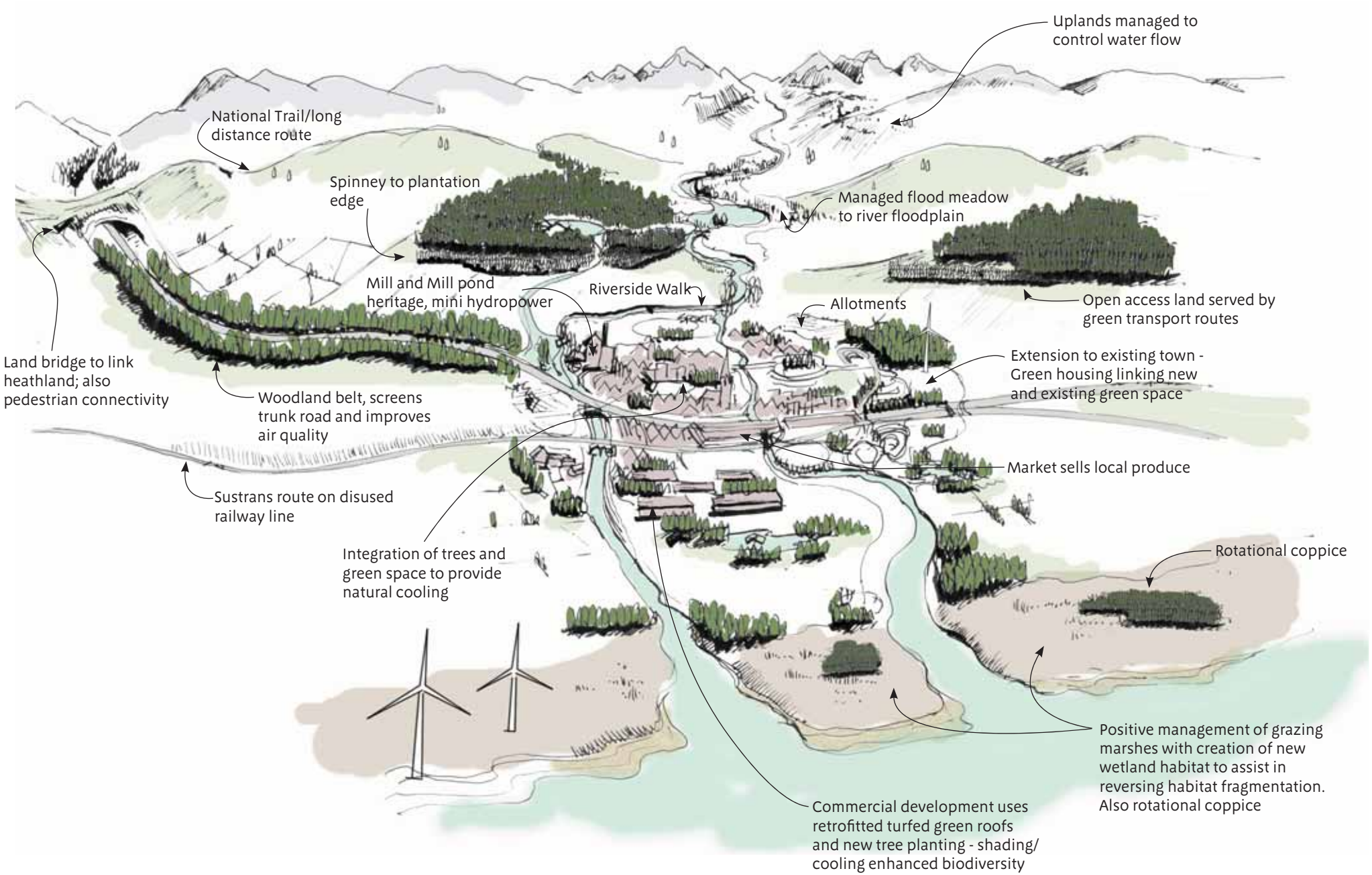


Figure 3.9: Green infrastructure, multifunctionality and place-making – example 1

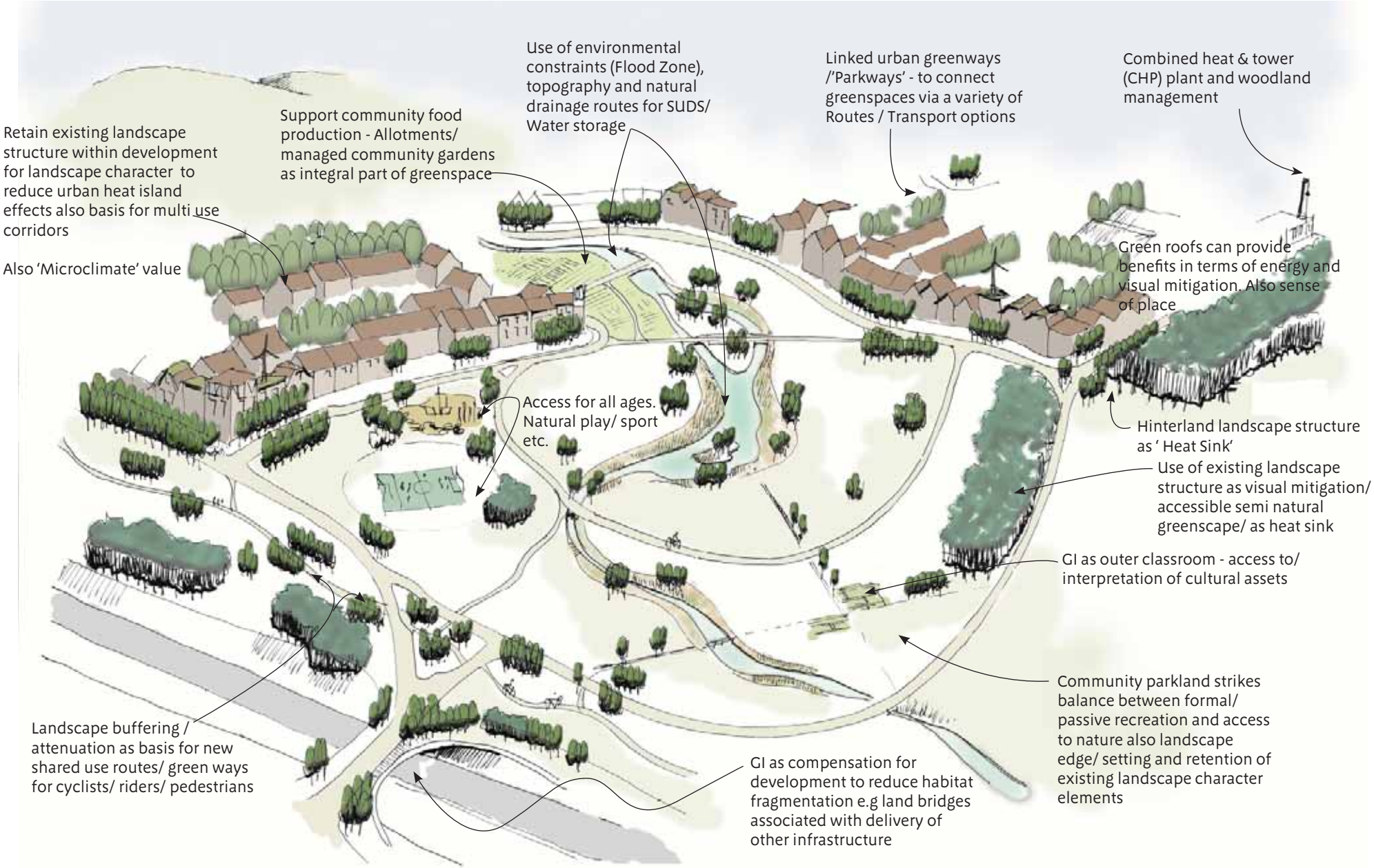


Figure 3.10: Green infrastructure, multifunctionality and place-making – example 2

The example illustrated in the case study below shows some of the principles of place making and multifunctionality in a 'real life' context.

Case study: Melbourn Riverside Park:
A small development of 5 houses provided the starting point for this scheme of wetland habitat creation and landscape enhancement of a neglected floodplain site, alongside the River Mel in Cambridgeshire. The 5 hectares of land along the riverside form a new riverside park, not only for the new residents but also for the wider community within the village of Melbourn. The scheme included implementation of a reptile mitigation strategy and connects to the green infrastructure network developed for the Cambridgeshire sub region. On completion, the park was handed over to the parish council as part of the Section 106 agreement. A detailed landscape and nature conservation management plan was an integral part of the Section 106 and is being used to steer management of the site to maintain and enhance landscape character and biodiversity.

Image source and further information: CSa Environmental Planning (www.csaenvironmental.co.uk)

SIGNPOST: Natural England and on the ground delivery of green infrastructure

Natural England is directly supporting, through funding or advice, a wide range of individual schemes and projects that show how GI benefits can be delivered in response to local priorities and needs. Some of these will be presented in 'Green Growth for Green Communities' available at http://www.naturalengland.org.uk/ourwork/planningtransportlocalgov/greeninfrastructure/default.aspx. Natural England's engagement with these projects recognises that the successful delivery of GI involves the application of a set of clear principles or steps, namely:

Inspire: Create an inspirational vision and win the support of local communities and decision makers.
Partner: Pull together broad-based partnerships that deliver new schemes and projects effectively and efficiently.
Enhance and Protect: Create and protect new sites and habitats for people and wildlife, which dove-tail with existing projects and natural green spaces.
Benefit: Green Infrastructure's vital importance to the local and regional economy is fully appreciated by businesses and decision makers.
Design and Innovate: Our designs for and promotion of green spaces and networks play a direct role in improving the lives, livelihoods and health of local people and communities.
Manage: Ensure long-term management of spaces is secured to retain quality green infrastructure with its many benefits.
Monitor Achievement and Celebrate success: We monitor the progress that has been made and check that we are continually improving and delivering our promises.

The case studies from home and abroad set out in this guidance document will have followed a similar route from inception to delivery.

Delivering Benefits

The tables in this section set out the potential benefits which may be delivered in relation to the seven green infrastructure functions identified in **Table 3.1.** Benefits are supported by case study illustrations where relevant. In each case reference is made to sources of further relevant information.

The fact that all of the functions meet economic policy priorities presents a compelling case for green infrastructure funding and delivery. Some of the direct and indirect economic benefits resulting from investment in green infrastructure are set out in the following tables. These are similar to the economic benefits cited in the work undertaken by Natural Economy North West, such as increased labour productivity, increased visitor spend and potentially enhanced property values in light of improved design and management of the setting for development. Other economic benefits result from the employment opportunities created by the environmental sector, in planning, designing, building and managing projects and sites which contribute to green infrastructure. Practical realisation of these benefits will in reality depend on appropriate design and future management, and use of effective engagement with partners and stakeholders during the design and implementation process.

Did you know? Some sources of interesting information

A poll of 2,000 adults by Hoegaarden (2005) found daily stress is a problem for 30% of the population. However, 84% said that being in contact with the natural elements made them feel more relaxed instantly. Other popular 'stress busters' included a walk in the park, the smell of cut grass and the sound of birds singing [19].

'The potential for reducing the environmental impact of the food chain through a more local system was identified by the Curry Commission report and has been highlighted by organisations such as Sustain. The main potential impacts are reduced transport demand and increases in environmentally benign farming practices'[20].

'Urban areas need to be drained to remove surface water, but the impermeability of many built surfaces raises the probability of flash floods. Green spaces, being covered in vegetation and a soil system, act like sponges to soak up rain water, reduce the volume and rate of run-off, recharge groundwater supplies, provide a level of water treatment, and play a key role in sustainable urban drainage. The rate of run-off for surfaces with trees and grass is estimated to be 10 to 20%, compared with 60 to 70% for 'hard' urban areas'[21].

A Chicago study by the Landscape and Human Health Laboratory at The University of Illinois found that buildings with high levels of greenery had 56% fewer violent crimes and 48% fewer property crimes than buildings with little or no vegetation[22] .

Access, recreation, movement and leisure

Policy priorities	Economic growth and employment	Protect and enhance cultural heritage	Promoting sustainable transport and reducing the need to travel by car	Community cohesion and life long learning; volunteering	Healthy communities; health and well being
Benefits of access, recreation, movement and leisure	Green economy, including: Making attractive places for living and working	Opportunities for education and interpretation, and to safeguard sites	Increased permeability of urban areas for walking, cycling and horse-riding	Places for meeting and events; reducing the perception of crime through enhanced permeability and accessibility	Healthy communities; health and well being Opportunities for exercise (passive and active recreation), relaxation and improved mental health
Evidence; sources and further information: Natural Economy North West has observed the potential for investment in GI to contribute to enhanced exercise and activity; The Government's Chief Medical Officer has noted the presence of 'compelling' scientific evidence that 'physical activity.. is essential for good health'[23] . In terms of the economic benefits of GI, research by Natural Economy North West has noted the direct and indirect benefits of green infrastructure and enhanced greenspace setting, in terms of increased productivity and increased visitor spend, and the employment opportunities afforded in the environmental sector. Similarly, research undertaken by AMION and ECOTEC[24] cites the economic value of GI in relation to the employment opportunities provided by the environmental sector, and the potential for increased land and property values.					

Case study:

Mardyke Greenway and Reedbeds (Mardyke Valley Trust, Thames Chase, Thurrock Council): A 3.3km bridleway route through the Mardyke valley which incorporates part of a Sustrans Route and therefore contributes to healthy communities and green travel objectives. The scheme also included creation of eleven reed beds and protected species habitats. The project was funded by EEDA and the Heritage Lottery Fund under the Communities and Local Government programme, and also delivered part of the South Essex Green Grid. It is a good example of a multifunctional green infrastructure project.

Figure 3.11: Mardyke Greenway (image: LUC)

Habitat provision and access to nature

Policy priorities	Economic growth and employment	Protect and enhance cultural heritage	Protect and enhance the landscape, geodiversity and natural environment	Biodiversity conservation and enhancement	Climate change adaptation and mitigation	Community cohesion and life long learning; volunteering	Healthy communities; health and well being
Benefits of habitat provision and access to nature	Green economy, including: Making attractive places for living and working, and to visit; Potential for increased property values	Opportunity for interpretation of historic landscape features and habitats e.g. pollard trees, and iconic species	Alleviate pressures on sites through provision of alternative access to nature. Increasing overall size of habitats may enhance their ability to absorb carbon (e.g. Fenland and salt marsh); Opportunities to create buffers and links, and to safeguard designated sites	Opportunity to conserve, enhance and reinforce habitats (contribution to BAP targets)	Linking sites to reverse habitat fragmentation; creating buffers	Community involvement and participation in creation and on going management; opportunities for education and interpretation and practical 'green gym' type activities	Physical and psychological benefits of access to nature
Evidence; sources and further information: The Ecological Network (EcoNet) approach relates to the potential to strengthen and reinforce habitats and to reduce their vulnerability to fragmentation in climate change. Green infrastructure can contribute to such an approach. The TEN (Transnational Ecological Network) project is an example of this landscape scale spatial planning [25], for which policy support is provided in PPS9. Work undertaken by the London Development Agency cites the potential of green infrastructure to buffer habitats from the effects of development [26]. Evidence for the psychological benefits of enhanced access to nature is provided in a number of studies which show that simply viewing a natural scene can rapidly lower anxiety and stress-related physiological symptoms [27].							

Case study:

Stort Valley: This has involved Natural England working with landowners to agree priority green infrastructure projects for the valley, including connecting footpaths, signage and habitat enhancement. Natural England is also working with landowners to improve the condition of the valley floor SSSI sites. The Stort Valley project is a good example of integrated working and delivery, both within Natural England and with external partners.

Figure 3.12: The Harlow Marshes , alongside the Stort (Image: Natural England)

Landscape setting and context for development

Policy priorities	Economic growth and employment	Protect and enhance cultural heritage	Protect and enhance the landscape, geodiversity and natural enviroment	Community cohesion and life long learning; volunteering	Healthy communities; health and well being	Climate change adaptation and mitigation
Benefits of landscape setting and context	Green economy, including: Making attractive places for living and working, and to visit; Potential to increase property values	Making attractive places for living and working, and to visit	Opportunity to provide enhanced landscape setting and to relate development to landscape character, place and context; Opportunities for habitat enhancement and creation	Community involvement and participation; interpretation and education	Places for meeting and events; provide a sense of place and identity	Opportunity to use water management for flood attenuation and for enhanced landscape setting, and for SUDS to link development to landscape context
Evidence; sources and further information: A high quality historic environment and attractive landscapes help to create places where people want to live and work, offering economic advantages in terms of inward investment and tourism[28]. A study in the South West showed that over 35% of businesses relocating to the region quoted environmental attractiveness as the key reason for their move [29].						

Case study:

Duisburg Nord Landschaftspark (Latz und Partner): Part of the transformational multi project International Building Exhibition Emscher Park (IBA) in the Ruhr District. The projects were characterised by a creative and collaborate multi regional authority partnership approach to delivery. The landschaftspark uses the skeleton and structures of the old AG Thyssen steelworks as a framework for an innovative new landscape park. The site becomes a giant fantasy playground, with a hydrological water park and varied opportunities for natural play (which challenge approaches to risk). The old railways throughout the site are used as the basis for new corridors and links. http://www.latzundpartner.de/

Figure 3.13: Duisburg Nord Landschaftspark (image: A Tempany)

Energy production and conservation

Policy priorities	Economic growth and employment	Climate change adaptation and mitigation
Benefits of energy production and conservation	Green economy, including: Making energy efficient and sustainable places to live and work	Provide the setting for renewable energy generation; Opportunities for climate change adaptation
Evidence; sources and further information: Research by the Forestry and Woodlands Framework for the South East [30] has also demonstrated the benefits for woodland management and landscape character as a result of an increase in demand for wood fuel and associated tree planting.		

Figure 3.14 Demonstrating both energy production (wind power) and conservation (extensive type green roof)

Case study:

Burnham Beeches National Nature Reserve Visitor Centre:

The new visitor centre for this nationally important ancient wood-pasture includes several green building measures, including a green roof, green oak construction for walls and claddings, and use of water saving devices[31].

Food production and productive landscapes

Policy priorities	Economic growth and employment	Protect and enhance cultural heritage	Protect and enhance the landscape, geodiversity and natural environment	Climate change adaptation and mitigation	Promoting sustainable transport and reducing the need to travel by car	Community cohesion and lifelong learning; volunteering	Healthy communities; health and well being
Benefits of food production and productive landscapes	Green economy, including: Making attractive and sustainable places to live and work	Opportunity to conserve elements of the historic landscape, such as orchards	Opportunity to enhance the landscape through appropriate design and management (e.g. community orchards, which make reference to landscape character)	Contribute to a carbon efficient approach to living	Contribute to a carbon efficient approach to living - low 'food miles'	Opportunities for food growing on allotments and community gardens, community involvement in planting and maintenance; education	Places for people to meet and gather; Contribution to health through diet and exercise

Case studies

Acorn Farm, Knowsley: A 4 hectare urban farm on a formerly derelict site, selling free range local produce and providing educational opportunities for children [32].

Mudchute City Farm: An 80 hectare city farm on the Greenwich peninsula, London, which provides education facilities and small scale local food production [33].

Figure 3.15: Opportunities for local food production

Flood attenuation and water resource management

Policy priorities	Economic growth and employment	Protect and enhance cultural heritage	Protect and enhance the landscape, geodiversity and natural environment	Biodiversity conservation and enhancement	Climate change adaptation and mitigation
Benefits of flood attenuation and water resource management	Reduced economic and insurance risk in light of enhanced water resource management	Opportunities for education and interpretation in relation to wetland - understanding of place and context	Opportunities to provide enhanced landscape setting and to relate riparian development to place and context	Opportunities to create and restore wetland habitats	Opportunities to link and create new wetland habitats
Evidence; sources and further information: Green infrastructure also contributes to the reduction of water pollution, through exploiting the natural processes of sedimentation, filtration and biodegradation to remove pollutants. Increased surface permeability may also make a small contribution to recharge of groundwater supplies, helping to maintain water levels over the year and prevent drought over the summer months.					

Case study:

The Hamptons, Peterborough: This 8000 dwelling development in South Peterborough, has afforded Natural England the opportunity to lead the preparation of a Delivery Plan, which has the agreement of all the stakeholders. Connectivity emerged as a key theme within the plan, including improved links for people and wildlife between Hamptons and the city to the north and Great Fen, a major landscape-scale project, to the south. The site includes a key site of nature conservation interest, Orton Pit, a disused clay pit with SSSI (Special Site of Scientific Interest) and SAC (Special Areas of Conservation) designations. Natural England for many years has been working closely with the developers O&H to ensure its protection. Due to the other environmental constraints posed by the site, the development also incorporates extensive Sustainable Drainage (SuDS) provision.

3.16: The Hamptons (image: Natural England)

Cooling effect

Policy priorities	Economic growth and employment	Protect and enhance the landscape, geodiversity and natural environment	Climate change adaptation and mitigation	Healthy communities; health and well being
Benefits of cooling effect	Green economy, including: Making attractive and comfortable places for living and working; Potential for more economically efficient buildings, through green roofing and associated insulation	Opportunities for provision of shading and cooling to restore and enhance landscape character and biodiversity, such as new tree, woodland and meadow planting, and also through green roofs and green walls	Opportunities for tree planting for carbon sequestration; Also creation of microclimates through structural landscape planting	Physical and psychological benefits
Evidence; sources and further information: Extensive mature tree canopies can, for example, contribute to a changed energy balance for a city, reducing the heat island effect and hence the energy consumed in cooling systems as well as in water supply treatment. Carbon savings associated with this reduced energy requirement have been calculated to be considerably greater than the amount sequestered directly by urban trees through photosynthesis[34] .				

Case studies

The Cube, Sheffield: A mixed use live/work development incorporating an extensive wildflower roof with locally sourced substrate [35].

Hemel Hempstead Ski Centre: Currently under construction. This will be the largest extensive green roof built in the UK. The scheme also includes for rainwater recycling, and retention of existing trees on site as part of the design [36].

SIGNPOSTS:
The potential of green infrastructure to provide for mitigation of and adaptation to climate change, including the migration of species, relates directly to Natural England's Policy Position Statement on Climate Change[37]. This states Natural England's commitment to positive action to mitigate and (if this is not possible) to adapt environments to climate change.

The importance of green infrastructure for climate change adaptation is reiterated in the **European Climate Change Programme's Green Paper,** *'Adapting to climate change in Europe – options for EU action*[38]*'*. This paper emphasises the necessity for Europe to adapt to climate change, and the challenges this poses for both European society and public policy. It establishes the benefits to be gained from addressing adaptation in an integrated and coordinated manner at the EU level.

The Green Paper states that climate change will significantly affect economies and societies through its impacts on ecosystems – *'healthy ecosystems will be more resilient to climate change and so more able to maintain the supply of ecosystem services on which our prosperity and well being depend'.*

Figure 3.17 Demonstrating the value of mature trees for shading and cooling, Russell Square, London (Image: LUC)

Section 4

Delivering green infrastructure effectively

Delivering green infrastructure effectively

Sustainable Community Strategies, Local Area Agreements and partnership working

Sustainable Community Strategies

The Sustainable Community Strategy (SCS) is the overarching strategy for promoting and improving the well-being of a local area and provides the vision to inform the spatial planning process (including the Local Development Framework). It is therefore imperative that green infrastructure is incorporated in the SCS. The evidence gathering stage of the plan making process must take place early enough to inform development of the SCS. Unprompted community consultation may not identify green infrastructure as a priority. Lead officers within the local authority and other local green infrastructure stakeholders should therefore actively engage with the Local Strategic Partnership (LSP) to ensure that the importance of green infrastructure is understood.

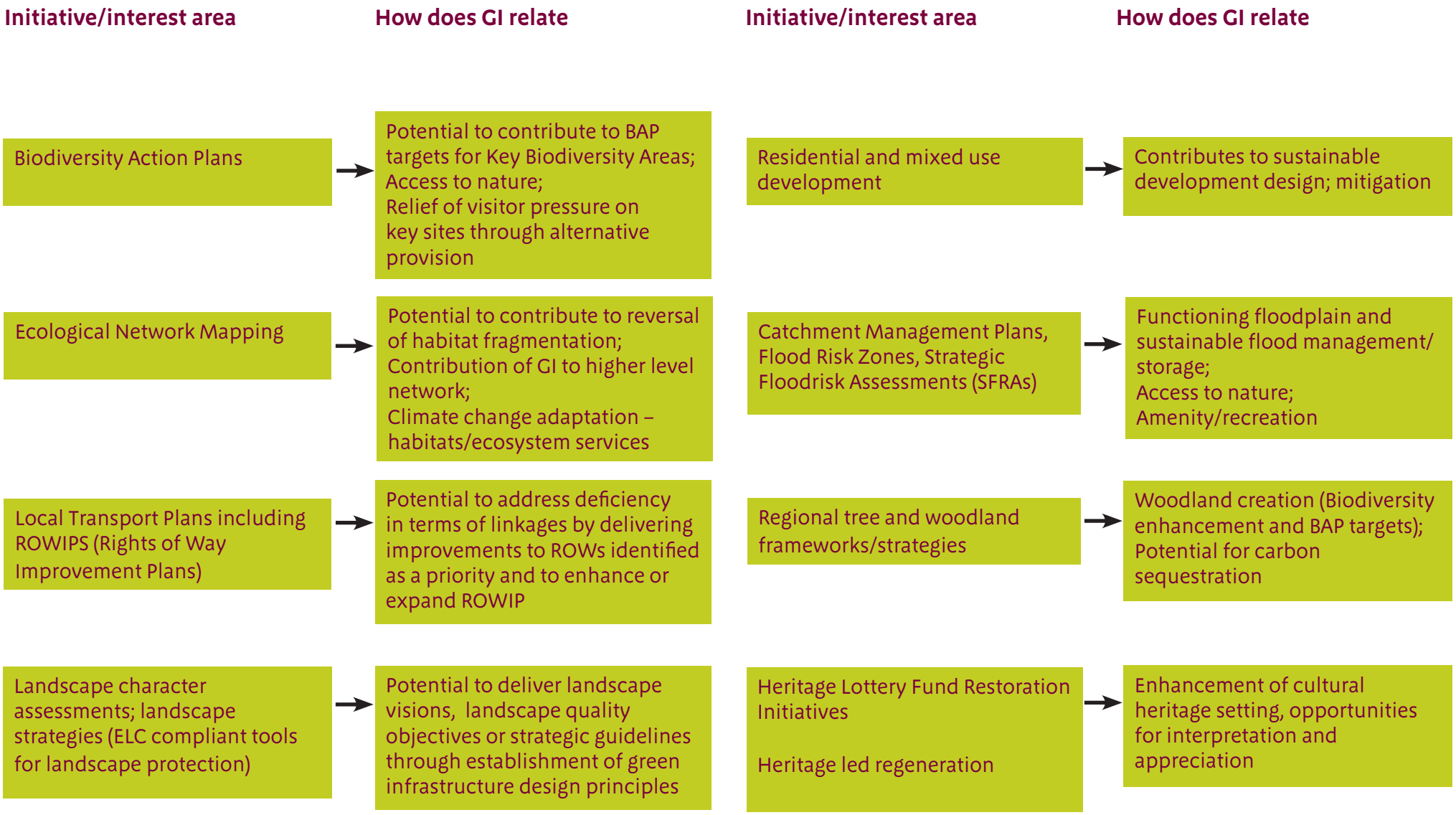
Local Area Agreements

Local Area Agreements (LAAs) set out the priorities for a local area agreed between central government and a local area (represented by the LSP). These priorities are translated into a set of LAA targets. LSP partners choose indicators that will best help achieve the agreed priorities, and set targets for each indicator, for each year of the LAA's three-year timeframe.

LAAs contain designated and non-designated targets. Designated targets are selected from the set of 198 National Indicators, and there is scope for local authorities to link green infrastructure delivery to a variety of the national indicators (for example those related to health, climate change, flood risk management and improved local biodiversity). Non-designated targets, also called local targets, are chosen by LSP partners to achieve priorities considered not to be addressed by the National Indicator set. These can be more directly linked to green infrastructure delivery.

Many of the opportunities to deliver improved or extended green infrastructure will lie not with the local planning authority but with other partners. For example, providing cycle routes within green links could help to meet objectives within a Local Transport Strategy for more sustainable travel and objectives within a local health strategy to increase the amount of exercise taken by local people. This further highlights the importance of ensuring that green infrastructure objectives are embedded in the SCS as well as in the Local Development Framework (LDF), and that they are reflected in LAA targets. Figure 4.1 further explores how green infrastructure relates to various partners' initiatives or objectives.

Fig 4.1: Relationship of green infrastructure to partners' objectives



Plan making

Early planning for green infrastructure – the advantages

Planning for green infrastructure should occur at the evidence gathering (survey and analysis) stage of the planning process, so that green infrastructure responds to character and place, and that standards are set for green infrastructure accessibility, quantity and quality. Responding to place relates to the European Landscape Convention (ELC), with the concept of landscape (and therefore landscape character) being the 'integrating medium', or a starting point for plan and decision making.

Similarly, the masterplanning of new development needs to be informed by the environmental opportunities and constraints on the site and environs. Green infrastructure planning involves an holistic response to site, context and environmental factors.

Early integration of green infrastructure can also ensure that it is properly planned in advance of development or delivered alongside development on a phased basis. In this way green infrastructure can be planned as an integral part of the community, and recognised as a valuable community asset or 'common ground'.

The important role of Green Infrastructure Strategies

Natural England recommends that all local authorities prepare a Green Infrastructure Strategy. Strategies can be produced at the sub-regional scale (by a number of local authorities) or at the local authority level. Green infrastructure strategies should be prepared early in the evidence gathering process when making spatial plans.

Although quite resource intensive, green infrastructure strategies have a number of advantages; not least that they articulate the green infrastructure planning process neatly, bringing all relevant partners and initiatives together under a 'common focus', and enhancing the understanding of green infrastructure assets. They also link strongly to other environmental, social and economic strategies and policies. Green infrastructure strategies set out a clear vision and framework for green infrastructure, which can be applied across local authority boundaries.

Strategies are based upon an analysis of existing provision, deficiencies and need. This analysis guides the strategy's priorities as well as highlighting opportunities for green infrastructure creation, enhancement and investment. This would not only cover the green infrastructure processes identified in stages 2-4 (strategic vision to submission plan) of Figure 4.2 but would also inform the 'Delivery' stage through identification of delivery and governance mechanisms.

Green infrastructure strategies have achieved a higher profile in the context of high levels of planned growth (e.g. Growth Points) so as to ensure green infrastructure provision is integrated into the development process from the very beginning, and to ensure that it complements and supports future development. Such strategies often form the evidence base for Local Development Documents.

While Green Infrastructure Strategies can be adopted as Supplementary Planning Documents (SPD), this must not detract from the need to embed the green infrastructure approach and relevant policies and proposals in the Core Strategy.

Development Plans – promoting and delivering green infrastructure

Even if a local authority is not producing a green infrastructure strategy, green infrastructure should still be embedded in the plan making process. As a statutory consultee in the development plan process, Natural England can seek to ensure that green infrastructure is integrated into the planning process at the following stages:

- at the early strategic visioning stage
- when an evidence base is being compiled
- in the development of spatial options and policy
- at the delivery stage.

This will greatly support any recommendations Natural England makes at the development management stage.

The multi functional nature of green infrastructure means that a number of development plan policies can support its implementation (e.g. landscape policy, flood risk policy, open space policy). An overarching policy should ensure green infrastructure is prioritised in planning decisions, and proposals should be identified on the key diagram or proposals map. Some examples of development plan policies are shown at **Appendix 2.**

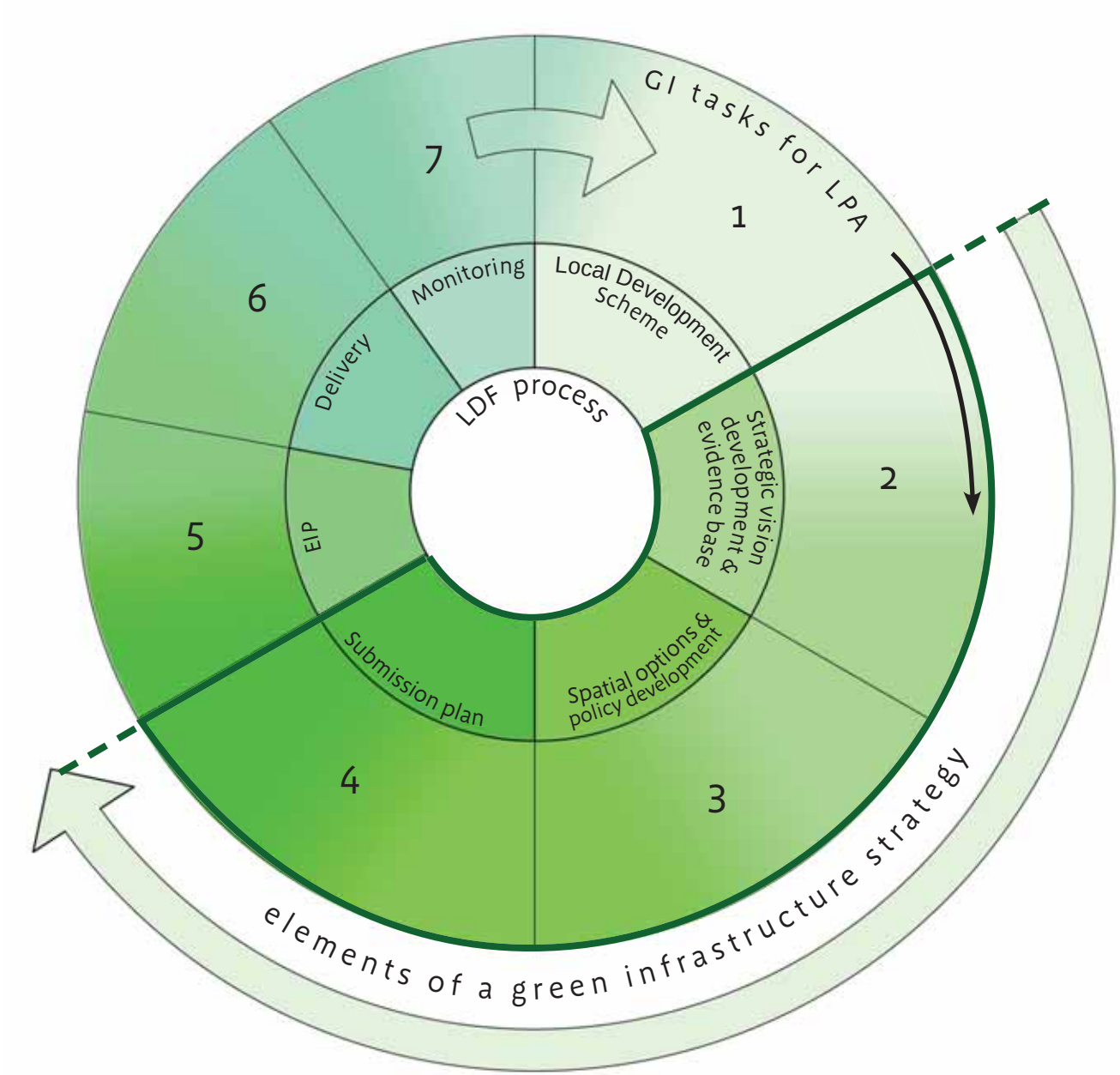
SIGNPOST:
As part of the consultation process regarding development plans, local authorities also consult Natural England on Sustainability Appraisals (SA), a statutory component of the plan making process. Natural England should use this opportunity to ensure SAs address green infrastructure, as this will subsequently inform the development plan content. For example, SA scoping reports are required to outline the environmental characteristics of the plan area, highlighting problems and deficiencies, and opportunities or assets. Natural England should ensure consideration is given to green infrastructure provision at this early SA baseline stage.

Figure 4.2 overleaf sets out a 'model process' for intergrating green infrastructure in plan making. Central to this is the understanding of place and character, including landscape character (stage 2 of Figure 4.2). The diagram shows a simplified approach for clarity. It is recognised that there is often considerable overlap between the stages in the process. As described above the key elements of the green infrastructure planning process (stages 2-4) within Figure 4.2 also form the components of a green infrastructure strategy. A similar basic approach to green infrastructure planning is also outlined in the North West Green Infrastructure Guide[39].

Figure 4.2 also outlines the potential involvement of an advisory group at the relevant stages of the process. Such an advisory group should include a representative from Natural England. The format of such a group is flexible, and could be either structured or informal in approach. It is desirable for the green infrastructure planning process to have a nominated Natural England 'champion' up to the Examination in Public stage.

It is apparent from Figure 4.2 that it is 'never too late' to integrate green infrastructure into the spatial planning process, although the baseline work and a preferred green infrastructure spatial option should be in place by the submission plan stage (stage 4 of Figure 4.2). Although green infrastructure work, such as a green infrastructure strategy, can be produced later, this would effectively amount to redrawing of the plan or 'going back to square one', making opportunities to influence the plan more difficult. If a green infrastructure strategy is introduced at submission plan stage, this would result in stages 2 -4 of the Green Infrastructure planning process being condensed into one stage.

Figure 4.2: Integrating green infrastructure, green infrastructure strategies and the spatial planning process



	GI tasks for LPA	GI advisory group role
1	-Identify how GI will be addressed in the Local Development Framework.	Confirm membership and roles of local GI Advisory Group to LPA. Comment on approach to GI in LDS.
2	-Environmental characterisation of plan area. -Establish local need for GI functions. -Identify deficiencies in existing GI (amount and type). -Initial assessment of broad opportunities and key delivery partners. -Document evidence base for future EIP.	Make data available for environmental characterisation. Advise on standards and other methods for assessing need.
3	-Identify GI opportunities. -Develop spatial GI options. -Develop supporting policy options. -Consult GI stakeholders. -Refine Options. -Other relevant strategies. -Initial scoping of delivery mechanisms.	Respond to consultation on options development. Address conflicts between environmental stakeholders.
4	Develop spatial plan for GI network with: -Strategic GI on Key Diagram. -All GI in Site Allocations / DPD / Area Action Plan. -Core Strategy policy framework. -Consult on and define delivery and long term management mechanisms.	Respond to consultation on delivery mechanisms.
5	-Refer to GI evidence base, if required.	Provide expert witnesses, if required.
6	-Secure relevant Local Area Agreement targets. -Planning decisions.	Advise on models for delivery.
7	-Monitor performance of GI in relation to identified functions.	Promote standardisation of monitoring across region. Highlight instances where management is diverging from planned function.

Key steps in the green infrastructure planning process

The key stages identified in **Figure 4.2** are set out below, supported by information sources likely to be required. The elements of this process which can be addressed through the production of a green infrastructure strategy are set out in stages 2-4 of Figure 4.2. Examples of green infrastructure planning (policies) are identified in **Appendix 2.**

Stage 1. Local Development Scheme

Green infrastructure tasks

With the publication in 2008 of a revised Planning Policy Statement 12: Local Spatial Planning, the Government no longer regulates the precise details of how a local authority should prepare a local development plan. There is a new emphasis on the Core Strategy which becomes more specific, detailed, spatial and focused. With the new opportunity to allocate 'strategic sites' in the Core Strategy, a Site Specific Allocations DPD may not be required.

Each Local Planning Authority will need to decide how it wishes to address green infrastructure planning within the LDF, for example whether an Area Action Plan or SPD is required to set out site specific detail. Given the need to integrate green infrastructure considerations at the earliest stages of the LDF, it is unlikely to be appropriate to address green infrastructure solely within an SPD. An SPD may be of use, however, in providing detailed guidance on implementation, delivery and design.

At this early stage, the Local Planning Authority should also take steps to raise awareness amongst key stakeholders, such as elected members, of the physical functions and policy benefits that green infrastructure can deliver.

Key outputs

A Local Development Scheme which includes details of how green infrastructure will be addressed in the LDF, plus awareness raising events.

Stage 2: Strategic vision development and evidence base

Green infrastructure tasks

The environmental character of the plan area should be defined at this stage, with reference to mapped data layers. Deficiencies and needs in relation to green infrastructure functions should also be identified, together with the initial assessment of opportunities and key delivery partners and projects. Early integration of green infrastructure can help to ensure that it is delivered in advance of or alongside the development it supports.

In addition to identifying high level and local green infrastructure initiatives, as well as future delivery partners, this stage will build the profile of or 'case' for green infrastructure, using any or all of the information on the right.

GI evidence base: typical information sources

National/Regional/Sub Regional/Local policy context; existing green infrastructure standards such as ANGSt (Accessible Natural Greenspace) 31 quality standards such as Green Flag Award, service standards such as those for National Nature Reserves (NNRs) and Country Parks or local standards where used

Regional/local green infrastructure initiatives (including identification of local projects and partners); Local Area Agreement targets

Environmental character datasets and supporting documents: Landscape Character Assessment, Historic Landscape Characterisation, Sites and Monuments Record, nature conservation designations, BAP Habitats, Ecological Network Mapping, Key Biodiversity Areas/Biodiversity opportunity mapping, PPG17 Assessment and Strategy, Definitive PROW Map, Local Transport Plan (LTP) including Rights of Way Improvement Plan (ROWIP), Strategic Flood Risk Assessment (SFRA), Indices of Multiple Deprivation

Population data and trajectories in light of anticipated growth

Early, informal consultation with statutory and other local green infrastructure stakeholders at this time will also help the evidence gathering process. The other objectives of this stage are to use justified standards and population trajectories to accurately identify green infrastructure deficiency and future need, and to identify potential future partners for delivery and governance.

Green infrastructure deficiency analysis should be considered from a variety of perspectives, including accessible semi natural greenspace and open space, establishment of local demand and need through stakeholder consultation exercises, and other functional requirements, such as land required for flood storage.

Deficiency and needs analysis – which standards to use?

As part of a green infrastructure advisory group, or more informally, Natural England staff may be called upon to help determine appropriate standards to inform a deficiency and needs analysis. A range of standards can be used and form a useful guideline. For example Natural England's Accessible Natural Greenspace Standards (ANGSt)[40] provide a catchment based hierarchy or typology of semi natural greenspaces, whilst local authorities have historically used open space standards to determine provision per head of population, often based on Fields in Trust's (formerly the National Playing Fields Association) Six Acre Standard. Sometimes standards which combine these two approaches are used.

However in every case standards can only be used as a guide as there can never be a 'one size fits all' solution. This is because green infrastructure provision must also reflect local need and the specific character, opportunities and constraints presented by individual sites, taking into account population trajectories and proximity to existing green infrastructure. It must also reflect, and not conflict with, the need for sustainable urban form (e.g. greenspaces accessible by sustainable modes of transport). Whilst it is important to plan the new green infrastructure in advance of development, it should also reflect established character (including landscape and townscape) and urban grain.

Further information on quality standards is set out in **Appendix 4**

SIGNPOST – Natural England's Accessible Natural Greenspace (ANGSt) standards

ANGSt aims to address the spatial distribution of natural greenspace, its accessibility at different size limits and the hectarage of Local Nature Reserve per head of population with the aim of securing access to natural greenspace close to where people live. These standards recommend that people living in towns and cities should have an accessible natural greenspace: (ANGST)[41]

- Of at least 2 hectares in size, no more than 300 metres (5 minutes walk) from home;
- At least one accessible 20 hectare site within two kilometres of home;
- One accessible 100 hectare site within five kilometres of home; and
- One accessible 500 hectare site within ten kilometres of home; plus
- Statutory Local Nature Reserves at a minimum level of one hectare per thousand population

Taken together, the environmental characterisation and the deficiency and needs analysis can be used to identify creative opportunities for new green infrastructure provision, enhancement of existing green infrastructure and for the creation and enhancement of green infrastructure linkages. Through discussions with other members of the advisory group and key stakeholders, it should also be possible for the local authority to identify potential future delivery partners.

Sustainability Appraisals and Habitat Regulations

Sustainability Appraisal (SA) is a statutory component of the plan making process. SA scoping reports are required to outline the environmental characteristics of the plan area, highlighting problems and deficiencies, and opportunities or assets. This should be informed by the findings of the evidence gathering stage of the green infrastructure process to ensure that green infrastructure provision is considered at an early stage of the SA process. Similarly, links should be made to the Habitats Regulations Assessment of the development plan from an early stage, considering, for example, the potential for provision of new areas of green infrastructure to avoid the impact of planned development on Natura 2000 or Ramsar sites.

A cross boundary approach

The evidence base should also feed into the Sustainable Communities Strategy (SCS) vision which will, in turn, guide the Core Strategy spatial vision. In developing the vision, it is important to consider cross-boundary issues such as the presence of large green infrastructure assets in neighbouring districts. One mechanism for this is the joint production of a sub-regional green infrastructure strategy. Such strategies aim to develop strategic links with green infrastructure networks in adjacent administrative area, both spatially (e.g. the connection of green spaces) and practically (e.g. identifying the relevant organisations to support collaboration and delivery across counties, and identifying appropriate funding sources for capital works and management).

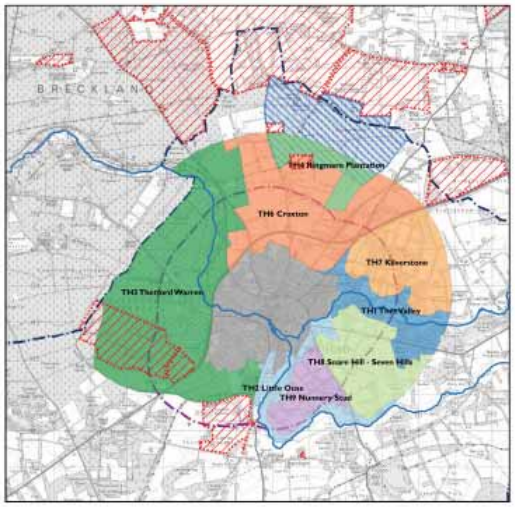
A co-ordinated response, the result of cross boundary working, is likely to be of particular value in the following situations:

- Where significant growth is proposed, and particularly where this crosses administrative boundaries;

- Where there is a major existing green infrastructure resource, or significant potential for a new one (e.g. in Thames Basin Heaths).

Examples of two components (characterisation and deficiency analysis) from this initial evidence gathering stage are shown in **Figures 4.3** and **4.4**, with the environmental characterisation and deficiency analysis undertaken by LUC for Thetford Growth Point.

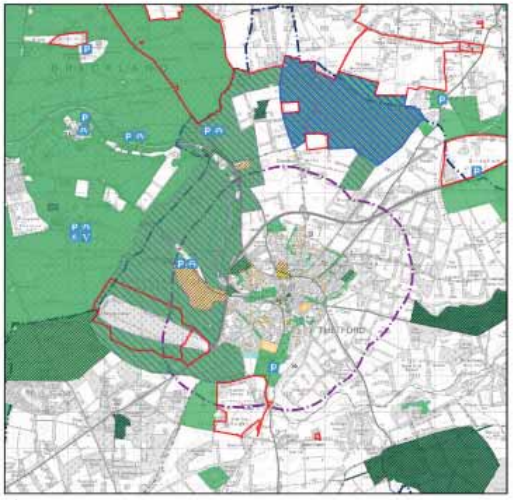
Key outputs of this stage: Characterisation map and deficiency and needs analysis; identification of outline green infrastructure opportunities and potential future delivery partners.



Landscape character

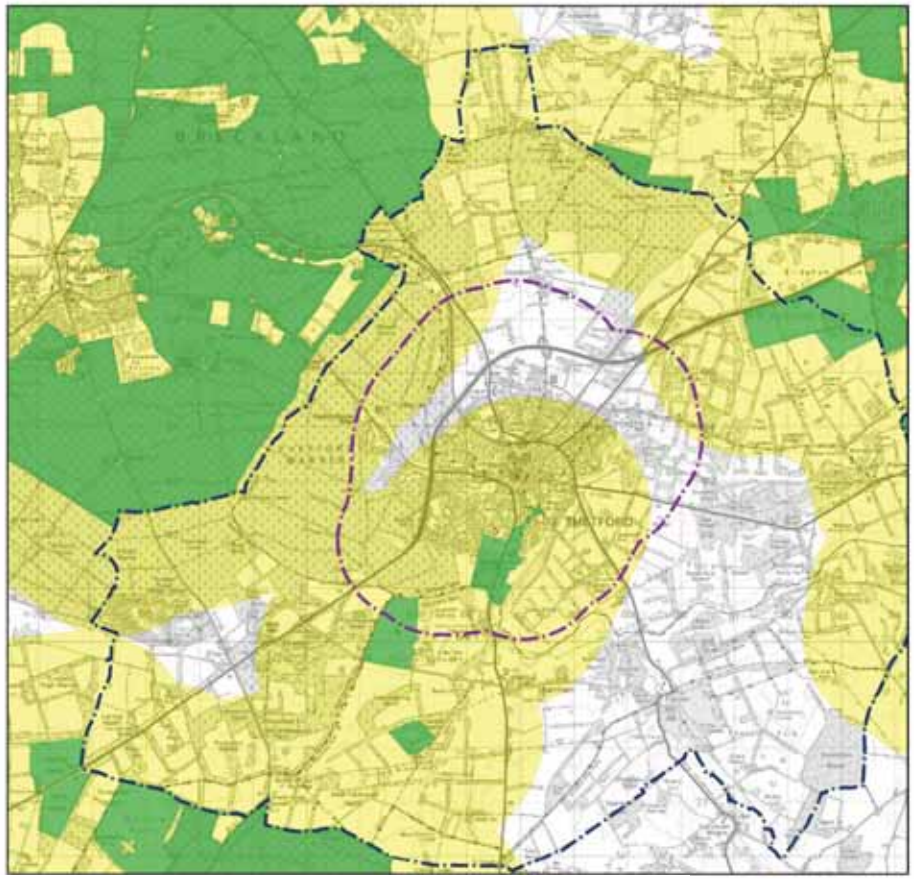
Cultural heritage

Biodiversity

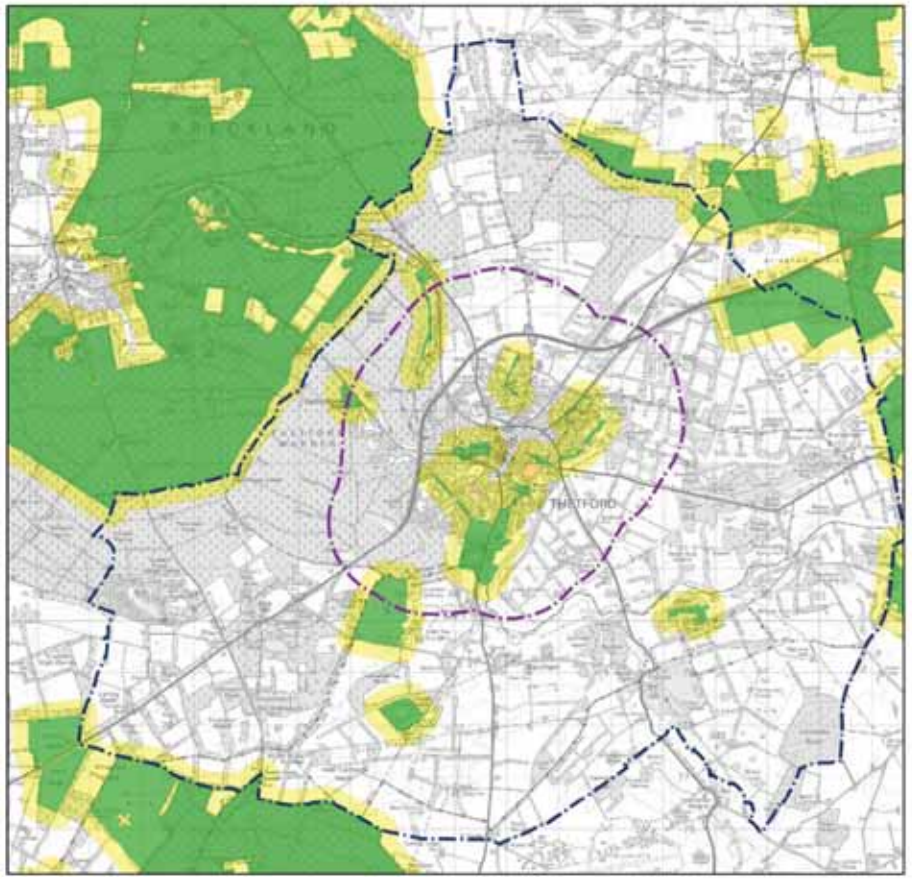


Open space

Figure 4.3: Environmental characterisation themes for Thetford Growth Point (Breckland Council/LUC)



District scale GI deficiency



Neighbourhood scale GI deficiency

Figure 4.4 : Extracts from the deficiency analysis for Thetford Growth Point (Breckland Council/LUC), using Natural England's ANGSt model

Stage 3: Spatial options and policy development:

Green infrastructure tasks

This stage involves using the evidence gathered in stage 2 to draw up an outline green infrastructure network, or several alternative options, for refinement through stakeholder consultation. Depending on local context, stakeholders may include representatives from the relevant agencies, local developers and landowners, community groups, council officers and members. Potential delivery partners are likely to be involved at this stage (including developers), as consultation workshops should also gather information on delivery and governance mechanisms to focus a green infrastructure implementation plan. Involving developers can be a positive element in the process, as it will inform them of likely green infrastructure needs to be factored into their budgets when purchasing sites, and it will also help ensure they are 'signed up' at an early stage to the green infrastructure approach, in terms of future provision, design and management.

Key outputs of this stage: Outline of preferred option for green infrastructure network.

Stage 4: Submission Plan:

Green infrastructure tasks

At this stage green infrastructure proposals and projects will have been identified and mapped in a format which can be used on a key diagram or proposals map, as appropriate. An example is shown in **Figure 4.5.** The proposals should be supported by an Implementation Plan (sometimes also called a Business Plan, Action Plan or Intervention Plan) to link capital and revenue projects or items to funding streams and delivery partners. Note that this and the proposals map will also form a key part of a Green Infrastructure Strategy.

Within the implementation plan, consideration should also be given to how the proposed green infrastructure projects fulfil the green infrastructure functions and provide benefits, the practical constraints to achieving the green infrastructure projects and an outline prioritisation exercise, to shortlist green infrastructure projects. Appropriate funding streams should be identified (with input from key partners and stakeholders), based on the character of individual projects, as should outline capital and revenue costs and phasing if enough detail is available, to ensure the guide to future investment in green infrastructure is as robust as possible. Examples of appropriate funding streams and governance models are set out in **Appendix 3.**

Key outputs of this stage: Spatial plan of green infrastructure network for inclusion in Key Diagram or Proposals Map; text for green infrastructure policies in Core Strategy; Implementation Plan, including preliminary recommendations for delivery.

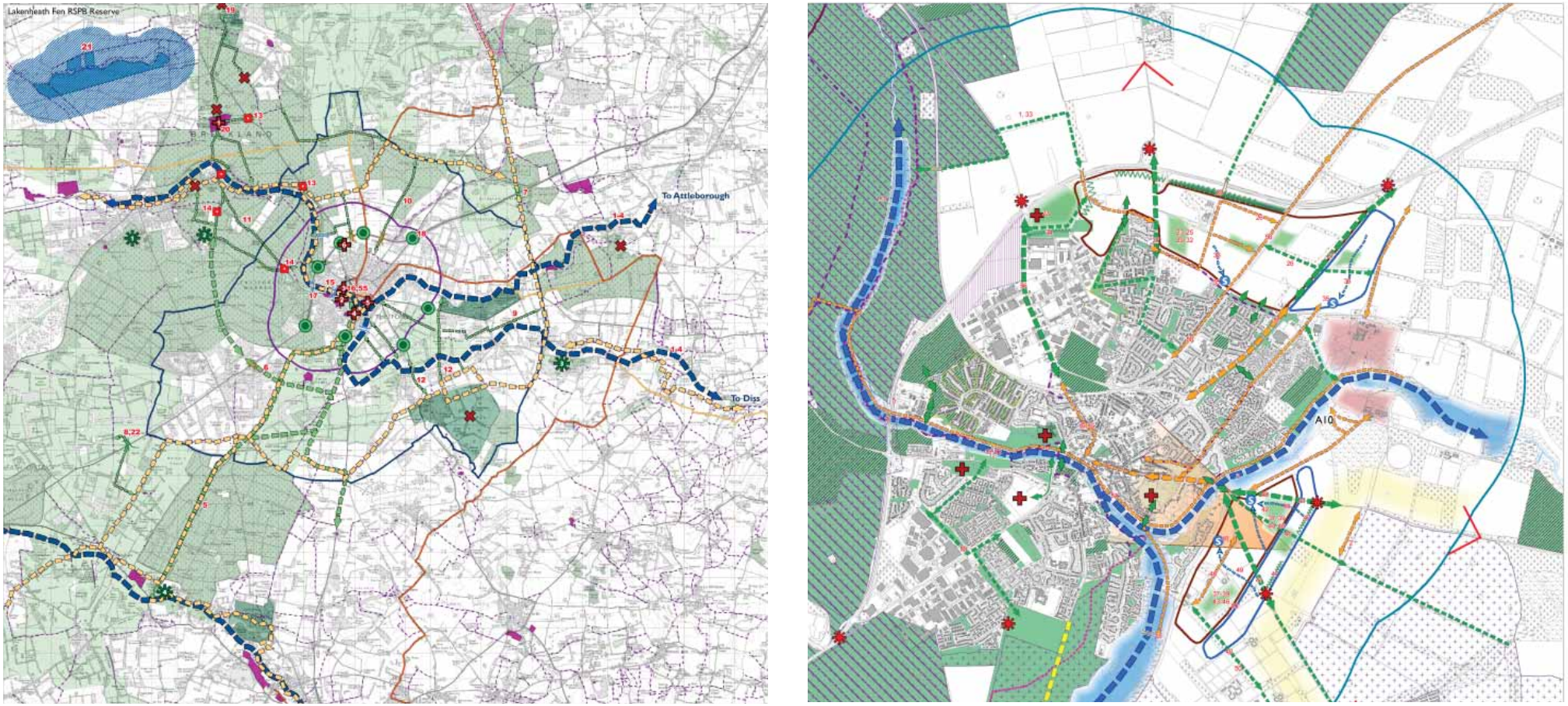


Figure 4.5: Strategic and local level green infrastructure network derived for Thetford Growth Point (Breckland Council/LUC)

Stage 5: Examination in public (EIP)

Green infrastructure tasks

Revisit and refer to evidence base, including the green infrastructure strategy (if one has been produced) or the green infrastructure proposals and policies, to determine that the 'test of soundness' has been satisfied. At this stage, it may also be appropriate for the local authority to call upon the support of statutory consultation bodies (including Natural England) and local stakeholders, who have been engaged in the process so far.

Key outputs of this stage: Presentation of green infrastructure evidence base at Examination in Public, if required.

Stage 6: Delivery

Green infrastructure tasks

This stage will make reference to the Implementation Plan produced for the Submission Plan above, to achieve practical delivery and implementation. Links should be made with the relevant partners to secure appropriate funding sources. In the earliest part of the delivery stage, actions identified within the Implementation Plan (such as land assembly or ownership negotiations, detailed site investigations, further consultation and feasibility studies to inform a design with a view to securing outline planning consent) should be in hand.

Key outputs of this stage: Funding and relevant Local Area Agreement targets secured; delivery body established; outline planning consent obtained.

Concept statements – a tool to aid practical delivery:
Natural England recommends that Concept Statements[42] are prepared either by Local Authorities or developers for specific sites prior to submitting a planning application. These are effectively development briefs for sites and can distil the high level green infrastructure principles in a Green Infrastructure Strategy, to influence site planning and design. They can therefore be valuable in setting a framework for high quality development which fits with the green infrastructure approach. They can also be used as a basis for Design and Access Statements, which explain the design intention and concepts of application schemes.

Stage 7: Monitoring

Green infrastructure tasks

Monitoring of green infrastructure performance in relation to specified functions can be achieved in several ways. These include site inspections by local authorities or adopting bodies prior to site handover to ensure planning conditions are met. To evaluate the performance of green infrastructure against specified functions, monitoring can also occur through visitor surveys (types of visit or reason for visiting), or in relation to biodiversity, understanding species migration patterns in relation to areas of new habitat. Various other existing means are available to monitor the success of green infrastructure, including the take up of Higher Level Stewardship and English Woodland Grant Schemes, or through the audit trail established for grant funded projects such as Heritage Lottery Funded schemes. Monitoring may also take place against the new National Indicators for Local Area Agreement Targets, such as National Indicator 188 (climate change). From a Natural England perspective, application schemes can also be evaluated for green infrastructure provision against specified standards such as ANGSt.

Monitoring indicators for Sustainability Appraisal are often very 'broad brush', relating to themes such as landscape character and biodiversity. Sustainability Appraisal of specific Development Plan Documents (DPDs) may however have more specific information in relation to monitoring green infrastructure. This could include monitoring of the percentage of planning applications with green infrastructure provision, or contribution towards green infrastructure, measured against defined standards or specific green infrastructure policies within the development plan, in addition to monitoring of the type and location of green infrastructure within planning applications.

Monitoring is a very useful exercise to establish the success of various components of a green infrastructure network, to inform and refine future iterations of the spatial plan. It should however be noted that no one standard process exists for monitoring and it is to an extent reliant on tools already in place.

Key outputs from this stage: Audit trail for future revisions of the spatial plan and evidence base.

Development management

Most significant development and land use change requires planning permission and the development management (development control) process affords considerable potential to promote and deliver green infrastructure. As a statutory consultee on planning applications Natural England has a key role to play in supporting this delivery. Natural England responds selectively to planning applications, and these will predominantly be large-scale proposals within Growth Areas and Growth Points and proposed Ecotowns or those which may impact upon protected species, habitats and landscapes. Large-scale proposals present the greatest opportunities for green infrastructure enhancement, whilst in the case of protected species and habitats the protection of existing green infrastructure is critical.

Examples of funding streams available through the development management process (including section 106 contributions) are set out in **Appendix 3.**

Delivery can come in the following forms:

- The protection, restoration and enhancement of existing green infrastructure, increasing functionality
- The creation of new green infrastructure
- The linking of green infrastructure assets

When considering how individual applications can contribute to green infrastructure delivery, there are various things to look for and incorporate into consultation responses:

- **Green infrastructure strategies** are important guiding documents to both inform and support recommendations made through the consultation process. Importantly, recommendations made in reference to green infrastructure strategies ultimately support their implementation and ensure consistency in green infrastructure delivery. Where green infrastructure strategies have not been produced for the respective development area, reference can be made to the evidence base for the plan (see stage 2 of **Figure 4.2).**

Tip: Design objectives within green infrastructure strategies are good guides to inform development proposals as well as Natural England's recommendations.

Tip: Through the development of a green infrastructure strategy, relevant partners will be highlighted who are key in the process of delivering green infrastructure in that respective locality. Developers should utilise these contacts for assistance in further understanding how their developments can support green infrastructure provision. These contacts may also be able to assist in the long-term management of green infrastructure, which development proposals should address.

- Where it exists, **green infrastructure policy** outlined in the Regional Spatial Strategy (RSS) or Integrated Regional Strategy and Local Development Frameworks (LDFs) should be referenced as this will support any recommendations made. Some examples of policies are shown at **Appendix 2**. It may be that there are no policies specific to green infrastructure, and in these cases, other RSS/LDF policies which have potential green infrastructure implications can be referred to – for example, policies regarding open space provision, flood risk and climate change. Additionally, national planning policy can act as a 'hook' to support recommendations.

Tip: In the East of England region, Natural England has developed a list of policies relevant to Green Infrastructure which can be easily referred to when preparing consultation responses.

- Where developments coincide with or adjoin existing green infrastructure, opportunities to restore (where needed) and enhance these assets should be encouraged. Any restoration or enhancement should ensure consistency with green infrastructure strategy objectives, where a local strategy exists.

- Proposed developments may lead to a reduction in green infrastructure. This is undesirable, but in cases may be unavoidable. In these cases, reductions should be recouped as far as possible through mitigation measures incorporated into the development design and secured through the planning process.

Green infrastructure considerations in relation to planning applications

Specific green infrastructure requirements will vary considerably according to the application. The following generic 'good practice pointers' provide a checklist to evaluate planning applications in relation to green infrastructure provision. The pointers are organised under a variety of themes. These are: i) landscape character, setting and management, ii) biodiversity and access to nature, iii) water management, iv) climate change adaptation, v) healthy, cohesive communities, vi) green travel, vii) green specifications, viii) standards and facilities, and ix) ensuring green infrastructure delivery. Where appropriate reference is made in italics to the relevant Natural England Strategic Outcomes, responsibilities and policy aspirations to which the checklist components can contribute.

The Town and Country Planning Association (TCPA) Guide 'Biodiversity by Design' [43], also has a number of useful pointers for green infrastructure design at the site masterplan scale.

i) Landscape character, setting and management

- Does the green infrastructure take full account of the European Landscape Convention (ELC) which requires a 'whole landscape' approach?
- Has account been taken of the key characteristics identified in the relevant landscape character assessments (LCAs), where appropriate, and delivery of design and management guidelines within ELC compliant tools such as LCAs and Landscape Strategies?
- Has a landscape management plan been prepared for the scheme?
- Does the management plan for the proposals allow for traditional and sustainable landscape management techniques e.g. sylvicultural systems such as pollarding or coppicing? (ELC, Strategic Outcome No 1: A healthy natural enviroment; Strategic Outcome No 4: Decisions that collectively secure the future of the natural environment)
- Does the scheme conserve existing structural landscape features, such as trees, woodlands and hedgerows? (delivery of ELC compliant landscape protection and enhancement; Strategic Outcome No 1)
- Where proposals abut settlement edges or create new edges, do they deliver peri urban landscape enhancement and restoration, in the form of new linkages both physical and visual? Is the setting of the settlement and the interface with the landscape enhanced? (Strategic Outcome No 1 and No 2: People are inspired to conserve and value the natural environment)
- Does the scheme conserve important geological or topographical features and key views or visual relationships? (ELC)
- Is positive reference made to the setting of historic landscape elements, such as parks and gardens or Scheduled Ancient Monuments (SAMs)? (ELC)
- Is provision made for the restoration of historic or lost landscape features? (ELC)
- If appropriate, does the scheme deliver opportunities for interpretation?

ii) Biodiversity and access to nature

- Does the scheme abut or incorporate a designated nature conservation site? If so does the scheme deliver positive management to conserve and enhance the condition and diversity of this? (Strategic Outcomes No 2 and 4)
- Does the green infrastructure take full account of other non-designated sites or BAP habitats or species?
- Does the project create new wildlife corridors to link existing sites and therefore assist in reversing habitat fragmentation? (Strategic Outcome No 2)
- Are new and accessible areas of habitat created, which could have the potential to alleviate pressures on other areas of habitat, and in the process help to achieve the Accessible Natural Greenspace (ANGSt) standards? (Strategic Outcomes Nos 1, 2 and 4; delivery of the ELC and ANGSt)
- Does the green infrastructure allow for more 'naturalistic' landscape management, to enhance biodiversity and character? (Strategic Outcomes 1 and 2)
- Has use been made of native plant material, and in particular planting of local provenance or locally sourced seed populations? (Landscape enhancement and ELC compliance, Strategic Outcomes Nos 1 and 4)
- If appropriate, does the scheme provide for free or natural play, to provide an educational resource for children (access to nature)? (Place-making objectives; contribution to spatial targeting; Strategic Outcome No 2)
- Has a nature conservation management plan been produced for the scheme? (This should be integrated with the landscape management plan)

iii) Water management

- Has provision been made for water balancing measures such as stormwater ponds or lagoons, to recharge groundwater? (Delivery of the ELC through appropriate design which responds to landscape character and place; Strategic Outcome No 3: Sustainable use of the natural environment; Policy Position Statement on Climate Change)
- Does the scheme incorporate SuDS, either in the form of permeable paving or swales? (Strategic Outcome No 3: Policy Position Statement on Climate Change)
- Has provision been made for green roofs to slow water run off?

iv) Climate change adaptation

- Does tree planting within the scheme have the potential to fulfil a shading and cooling function? (Strategic Outcome No 3; Policy Position Statement on Climate Change)
- Do buildings or structures within the scheme incorporate provision for 'urban greening' or shading through green roofs or walls (also contribution to sustainable water management)?
- Are microclimates created through new or restored areas of landscape, such as woodland, shelterbelts or wetlands? (Strategic Outcome No 1)
- Does the green infrastructure allow species to move in response to climate change, through creation of habitat corridors and linkages? (Policy Position Statement on Climate Change)
- Does the scheme use street trees, if appropriate to provide 'urban greening', positioned to reduce water run off? (Policy Position Statement on Climate Change)
- Does the scheme provide for SuDS to recycle grey water and harvest rainwater, or, where appropriate, to reduce flash flooding in rivers?

v) Healthy, cohesive communities

- Does the distribution of green spaces meet Accessible Natural Greenspace Standards (ANGSt)?
- Is provision made for local food production, either in the form of allotments or community orchards and gardens? (Strategic Outcomes No 1 and 4)
- Does the scheme provide for active recreation e.g. Green Gyms, health walks, cycling routes?
- Does the scheme provide passive recreation for all ages which can enhance social interaction e.g. meeting places, quiet areas and areas for natural play?

vi) Green travel

- Does the scheme connect to or incorporate an existing or planned low carbon transport, or a recreation network, such as walking and cycling routes? (Strategic Outcome No 3)

vii) Green specifications

- Does the project make use of locally sourced or grown plant material? (Strategic Outcomes No 1,3 and 4; also potential to deliver landscape character enhancement and to contribute to delivery of ELC compliance)
- Has use been made of site won material?
- Have reclaimed materials been used for structures or hard landscape works?

viii) Standards and facilities

- Have standards been adopted for the quality and accessibility of facilities such as green spaces and the services visitors can expect from different spaces?

ix) Ensuring green infrastructure delivery

- Have planning conditions been put in place to secure green infrastructure and to ensure the required funding is in place?

- Are there proposals for adoption, long term management and governance (with identified parties and funding sources)?

The possibilities of the green infrastructure approach

These 'before and after' photographs of Bedfont Lakes (The Rutland Group, London Borough of Hounslow) below show the potential of the green infrastructure approach as realised through practical implementation.

Bedfont Lakes is a Country Park within the green belt in West London. The site was worked for gravel extraction until the 1960s and was redeveloped from the 1990s. An office/mixed use development occupies part of the site, with the remediation of the majority of the site given over to a new Country Park including landforming, extensive woodlands, areas of meadow grassland and wetlands. The scheme retains a Green Flag Award for its management.

Bedfont Lakes:
Site before redevelopment as multifunctional green infrastructure.

Bedfont Lakes:
After completion of Country Park and wetlands. (Images LUC)

Appendix 1

Glossary of terms

Glossary of terms

Term	Definition
ANGSt	Accessible Natural Greenspace Standards – a four level spatial typology used by Natural England.
AAP or Area Action Plan	A form of Development Plan Document or DPD, which sets out proposals and policies for the development of a specific area.
Blue infrastructure	This term is sometimes used to describe riverine and coastal environments with a green infrastructure network.
Capital costs	Cost for investment activities e.g. implementation of projects (including construction and enabling, clearance and demolition or remediation works).
Climate change adaptation	The ability of a place to adapt to both extreme weather events and long term changes to climate patterns.
Ecosystem services	The essential services and benefits that are derived from a fully functioning natural environment, including the management of basic resources such as water, and the sequestration of carbon.
Eco-towns	The essential services and benefits that are derived from a fully functioning natural environment, including the management of basic resources such as water, and the sequestration of carbon.
European Landscape Convention (ELC)	This seeks to protect landscapes in law, with consideration given to landscape from the earliest stages in the planning process. The UK became a signatory to the Convention in February 2006 (ratified in November 2006).

Term	Definition
Geodiversity	Geological diversity – the varied range of rocks, minerals and topographic characteristics/ landform, together with the processes instrumental in forming these features over geological time. The various components of our geological heritage can give insights into past climates, earlier environments and the development of life on earth[44] .
GI	Commonly used acronym for green infrastructure.
Green Flag Award	The national standard or 'benchmark' for parks and greenspaces within England and Wales.
Green infrastructure	Refer to Definition at page 7
Green infrastructure study	A report which assimilates baseline information for green infrastructure for a given location, e.g. local standards, initiatives and establishment of environmental character. Such a study may go as far as investigating deficiency and need based on projected growth, and identifying opportunities.
Green infrastructure strategy	Building on the green infrastructure study approach, developing a GI hierarchy and identification/prioritisation/phasing of projects through an Action Plan or Implementation Strategy (usually developed after the completion of the Strategy and which often provides information on capital and revenue costs, management needs, funding streams and delivery partners, although this varies with the scale of the strategy). Also sometimes referred to as a Green Infrastructure Plan, and often forming -evidence base for SPD/ AAP.

Term	Definition
Growth Point	Growth Points are a means by which local authorities can pursue large scale, sustainable growth, in partnership with central government and other local partners. They are based on four key principles, and these are i) early delivery of housing as part of the growth plans, ii) supporting local partners to achieve sustainable growth, iii) working with local partners to ensure that infrastructure and service provision keep pace with growth, and iv) ensuring effective delivery [45] .
Greenspace	A key component of a green infrastructure network, often classified within the typology devised by Planning Policy Guidance 17 (PPG17): Planning for Open Space, Sport and Recreation
Greenspace strategies	These evaluate publicly accessible open space provision within these typologies at the local authority scale, noting issues in relation to condition, quality and access, often to inform a strategy and action plan that sets out future management and regeneration policies.
Implementation Plan	This often forms part of a Green Infrastructure Strategy, and identifies funding streams and partners to deliver green infrastructure projects. In some cases capital and revenue cost estimates are provided, together with outline phasing. Implementation plans can also form stand alone documents and are sometimes called Action Plans, Business Plans or Intervention Plans.
Indices of Multiple Deprivation (IMD)	These aggregate a number of indicators of social, economic and housing deprivation, into a single deprivation 'score' for a discrete area (local authority wards are often used)[46].

Term	Definition
Landscape	'...an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (source: European Landscape Convention or ELC).
Landscape Character Assessment (LCA)	A process for classifying the landscape into areas of like or common character, based on physical and human influences. The assessment describes the physical, cultural and perceptual character of the landscape before separately evaluating that landscape, often in terms of important or sensitive features. LCAs often identify strategic objectives in respect of landscape planning, design and management, which can be equally applicable to GI.
Landscape quality objectives (LQOs)	For specific landscapes, a statement of important characteristics which people want recognised in that landscape (ELC).
Local area agreement (LAA)	These set out the priorities for a local area agreed between central government and a local area (the local authority and Local Strategic Partnership)[47].
Local Strategic Partnership (LSP)	Multi-agency, non-statutory partnerships, which match local authority boundaries. They bring together different components of the public, private, community and voluntary sectors, allowing different initiatives and services to support one another with the aim of more effective joint working[48].
Multifunctionality	The ability to provide multiple or 'cross cutting' functions, by integrating different activities and land usage, on individual sites and across a whole green infrastructure network.

Term	Definition
Peri urban	The transition between rural and urban landscapes, or the interface between landscape and townscape. Sometimes also referred to as the urban-rural fringe, and by Nan Fairbrother [49] as the 'green-urban' environment.
Revenue costs	Costs associated with ongoing management and maintenance of green infrastructure
ROWIP	Rights of Way Improvement Plan – a statutory responsibility introduced by the Countryside and Rights of Way (CROW) Act 2000. Now subsumed within Local Transport Plans.
SINC	Site of importance for nature conservation – a local nature conservation designation.
Sustainable Drainage Systems (SuDS or SUDS)	Formerly called Sustainable Urban Drainage Systems. An approach to managing rainfall and run off in developments, with a view to replicating natural drainage. SuDS also aim to control pollution, re charge ground water, control flooding, and often provide landscape and environmental enhancement [50] .
TEN Project	Transnational ecological network – a project which aims to link (primarily wetland) habitats to reverse habitat fragmentation. Component ecological networks have been developed in the UK for Norfolk and Suffolk.

Appendix 2

Examples of Green Infrastructure Policies and Planning

Examples of Green Infrastructure Policies and Planning

Policy

Regional

East of England Plan (2008)

Policy ENV1 of The East of England Plan focuses specifically on green infrastructure. This policy states that Local Development Documents should:

– Define a multiple hierarchy of green infrastructure, in terms of location, function, size and use levels, based on analysis of natural, historic, cultural and landscape assets, and the identification of areas where additional green infrastructure is required;

– Require the retention of substantial connected networks of green space in urban, urban fringe and adjacent countryside areas to serve the growing communities in key centres for development and change; and

– Ensure that policies have regard to the economic and social as well as environmental benefits of green infrastructure assets and protect sites of European or international importance for wildlife.

Policy SS8 of the East of England Plan states that targets for the provision of green infrastructure for planned urban extensions should be developed by local authorities and detailed in Local Development Documents (LDDs).

Local

North Northamptonshire Core Spatial Strategy (2008)

One of the key objectives of the North Northamptonshire Core Spatial Strategy is to secure a net gain in green infrastructure. Policy 5 of the Core Spatial Strategy is specific to green infrastructure. The policy states that sub-regional green infrastructure corridors will connect locations of natural and historic heritage, green space, biodiversity or other environmental interest. The policy also states that these corridors will be protected through:

– Not permitting development that compromises their integrity and therefore that of the overall green infrastructure framework;
– Using developer contributions to facilitate improvements to their quality and robustness;
– Investing in enhancement and restoration where the opportunities exist, and the creation of new resources where necessary.

Policy 16 of the Spatial Strategy concerns Sustainable Urban Extensions. It states that Master Plans for urban extensions should make provision for a network of green spaces linking the area to the wider green infrastructure framework.

Planning

Sub regional

Cambridgeshire Sub Region Green Infrastructure Strategy (2006)

In the context of an ambitious housing target for the Cambridgeshire sub-region, a Quality of Life programme was established to develop quality standards for housing developments. An element of this programme was the development of a green infrastructure strategy to address large-scale green infrastructure for the sub-region for a 20 year period. The strategy aimed to develop new green infrastructure initiatives as well as supporting those already being pioneered by agencies across the sub-region.

The Plan is built upon an analysis of the environmental context of the sub-region, which addresses, for example, the water environment, the historic landscape environment, and the climate change implications for the area's environment. A spatial analysis of existing green infrastructure was carried out at the sub-regional, district and city levels. The use of GIS tools was integral to this, for example, in the mapping of strategic linear corridors.
From the evidence base, a vision for the Strategy was then developed building upon both future proposals and current initiatives. The vision addresses funding opportunities, such as through Section 106 Agreements and the New Parks for People Programme. It also establishes key recommendations which it links into existing projects within the sub-region, through which the Strategy's vision can be achieved.

Local

Thurrock Green Grid: Green Infrastructure Framework Plan (LUC, 2006)

Building on the Thames Gateway Green Grid, this Framework Plan was developed alongside Thurrock's Open Space and Biodiversity Studies. In combination, the three studies created a Green Grid Strategy for Thurrock, which sets out the opportunities and priorities for multi-functional green infrastructure within the district for a 15 year period. The Framework Plan assesses existing and potential elements within Thurrock that contribute to a local Green Grid and the broader green infrastructure network of the district's urban and rural areas. The Plan aims to identify a vision and set of overarching principles for planning, design and management of green infrastructure in Thurrock.

GIS was integral to identifying the spatial nature of green infrastructure assets and opportunities within Thurrock – for example, open space, public rights of way, cycle networks, biodiversity assets and heritage features. The quality and condition of the landscape was also assessed, as was the potential for enhancing or conserving key landscape features. Research was completed into key organisations and existing initiatives that could play a part in promoting and delivering green infrastructure in the district.

The Government's proposed Eco Towns

Green infrastructure is recognised as being *'essential to both the environmental sustainability and the long-term social and economic success of eco-towns'* (Eco-towns Green Infrastructure Worksheet, 2008[51]). This Worksheet emphasises the importance of integrating GI completely within the detailed planning of eco-towns, with green infrastructure expertise feeding into the planning and decision-making phases. It also has a number of key recommendations, including: green infrastructure should be factored into land values and decisions on housing densities and urban structure, and should be designed to reflect and enhance the area's locally distinctive character; and that green infrastructure should be implemented primarily through focused green infrastructure strategies and the spatial planning system of Regional Spatial Strategies (RSS) and Local Development Frameworks (LDFs), and that it should be formally adopted within these planning policy documents. Although the worksheet is aimed specifically at the proposed Ecotowns it sets out standards for green infrastructure that can be applied more widely to new developments.

Appendix 3

Green infrastructure funding and governance models

Green infrastructure funding and governance models

Multifunctional green infrastructure can be secured via a number of different funding streams and governance models. Local authority funding is the traditional model. However, local authority budget allocations combined with the absence of a statutory duty for GI provision or management, limits the potential of this approach alone to secure the design, implementation and management of high quality green infrastructure. A short summary of some appropriate alternative models (with some examples) is set out below.

Multi agency public sector grant funding

Funding for green infrastructure can come from a range of government departments and public agencies, based on the policy objectives supported (e.g. housing growth) or delivered (e.g. healthy living and healthy communities) by green infrastructure.

Creation of multifunctionality in green infrastructure and component greenspace projects is crucial for successful application of these funding models. Local authorities have a pivotal role to play, in forming partnerships with public sector organisations whose goals are served by green infrastructure functions.

Some examples of multi agency public sector grant funding are set out below:

Safer and Stronger Communities Fund (SSCF)

This consolidates DCLG and Home Office funding streams available to local authorities, aimed at tackling crime and anti-social behaviour, empowering communities, and improving the condition of streets and public spaces, particularly in disadvantaged neighbourhoods. The fund was created in 2005 and is scheduled to run to 2010.

Heritage Lottery Fund (HLF) and Big Lottery Fund grant initiatives

Parks for People is one of the HLF grant schemes, supporting capital and revenue projects to improve public parks, including historic parks and designed landscapes. It also creates opportunities for communities to learn about the natural environment. Key

to the success of HLF grant schemes is expert monitoring – the establishment of an audit trail which can be used as part of the wider GI monitoring procedure.

Big Lottery Fund programmes such as Access to Nature (administered by Natural England) which aims to to encourage people from all backgrounds to understand, access and enjoy our natural environment, can be used creatively to involve people in their local greenspace, for example through monitoring of biodiversity.

Environmental Stewardship schemes administered by Natural England

Higher Level Stewardship (HLS) schemes can support projects to enhance the landscape quality, natural resources, biodiversity, historic environment and public accessibility and understanding of farmland in private ownership.

English Woodland Grant Scheme administered by the Forestry Commission

This supports projects to create new woodlands and enhance the management of existing ones for public benefit, on farmland in private ownership. Separate grant schemes are available for planting of new woodlands and for bringing existing ones into management[52], as well as for regeneration and improvement of existing woodland plantings. Grants could apply to large scale woodland planting in relation to urban extensions, where visual mitigation is required.

Aggregates Levy Sustainability Fund administered by Natural England

This supports projects mitigating the effects of aggregate extraction on local communities and the natural environment.

SITA Trust offers Enriching Nature and Enhancing Communities grants, for projects around qualifying waste processing and landfill sites[53].

Priory Park, Reigate – an example of successful delivery of HLF funding (image LUC)

Tax initiatives

Ring-fencing of local taxes

This can fund delivery and management of greenspace in expectation of increasing visitor and customer numbers and 'liveability' for residents and workers. This approach has been applied successfully overseas, including the Parisian parks implemented from the 1990s. However, there are currently few greenspace examples in the United Kingdom, as UK local authorities have little autonomy to impose additional local taxes.

Business Improvement Districts (BIDs)

English local authorities have limited freedom to impose additional taxes across whole districts. The **Business Improvement District (BID)** Regulations[54], however, allow local businesses to vote for a levy on their rates bill to fund investment in the local trading environment. Research[55] shows that UK BID schemes (e.g. Reading[56] and Winchester[57] town centres) have focused on investment in public safety, promotion and street cleaning. Potential exists to extend investment to greenspaces, however, as these can address all of the top three business needs from BIDs[58] - environmental improvement, crime and safety, attracting more visitors.

Successful application of the BID model will require greenspaces to be located in close proximity to those local businesses to be taxed under the scheme. It will also be necessary to convince local businesses of the potential benefits which will accrue in terms of visitor perceptions and numbers. Availability of initial funds to develop a BID scheme may act as a constraint. A BID scheme must also be integrated with other strategies which can improve the commercial and residential environment, and which can provide support for enhancement of greenspace.

Parisian parks show a high standard of management provided by the ring fenced model (image A.Tempany)

Planning and development opportunities

Planning conditions

Local authorities can require restoration or enhancement, or creation of greenspace, as part of the conditions of planning consent for a particular development. These are separately applied for each proposal, and are often supported by arrangements for funding and future adoption. As with planning obligations below, they must be necessary to allow the development to proceed, and must relate directly to the effects of the proposed development (e.g. to mitigate the development's environmental impact).

Planning obligations (section 106 agreements)

In this case, the developer agrees with the local authority to fund provision and management of greenspace required by a specific development. They are separately negotiated for each development proposal. Section 106 agreements can be limited by the schedules of rates local authorities operate for maintenance. These may act as a barrier to creative greenspace design as it may be perceived as more costly to maintain.

Examples of section 106 agreements include the Forest of Marston Vale in Bedfordshire, where section 106 contributions are being used to provide for ongoing management for a 25 year period (monies held by a Trust).

There must be a strong evidence base to justify the need for green infrastructure in relation to other infrastructure requirements and planning obligations (e.g. affordable housing) of new development. For them to apply, the land must also be under the control of the applicant.

Melbourn Riverside Park, Cambridgeshire – an example of the successful application of a section 106 agreement to secure capital works and deliver the management plan (image: CSa Environmental Planning)

Roof taxes

This is where the local planning authority requires the developer to pay a standard tariff per new dwelling to fund essential supporting infrastructure, including green infrastructure. Such an approach has been applied successfully by the Milton Keynes Partnership and delivered in association with the Parks Trust, and also in Mid Bedfordshire District, through a Planning Obligations SPD.

Community Infrastructure Levy (CIL)

A charge levied by local authorities on new developments, using formulae based on the size and character of the development, with proceeds to be spent on local or sub-regional infrastructure, including green infrastructure, required by the development plan(s)[59].

Regional Infrastructure Fund (RIF)

This supports delivery of essential infrastructure for large developments within a Growth Area or Growth Point.

Growth Point funding

Supporting delivery of infrastructure in named Growth Points, though the Housing Growth Fund. As a pre requisite to the allocation of funding by Government, local authorities are required to produce 'Programmes of Development', setting out their infrastructure spending requirements (which includes green infrastructure). Funding is allocated as block funding to relevant local authorities rather than ring-fenced for particular projects, and as such can apply to a wide range of projects identified within a Green Infrastructure Strategy.

Private management charges

In this instance publicly accessible greenspaces are created by the developer who retains ownership of them and funds ongoing maintenance via management charges levied on leaseholders on the development site. A successful example is the Canary Wharf Estate in London's Docklands – this includes over 8 hectares of open space which is publicly accessible but owned and maintained by a private company (Canary Wharf Group plc). Funding comes from the £30 million per year in service charges collected from building tenants on the estate. Limitations of such an approach are that charges are only applicable where a private property company retains ownership of both greenspace and freeholds on the properties. Negotiated sums must also be calculated to cover long term maintenance, and not just capital costs.

Bonds and commercial finance

The Local Government Act 2003 means that local authorities are now free to raise finance for capital expenditure from any source without Government consent, provided they can afford to service the debt without Government support.

In theory, this provides an opportunity to raise loan finance, e.g. by issuing bonds, for greenspace improvement or expansion. Loan repayments would be funded from a combination of increased council tax revenues, due to the rise in domestic property values attributable to high quality local greenspace and revenue generating uses within the greenspaces themselves (see 'Income Generating Opportunities' funding model).

Whilst this is a way to obtain a large lump sum at the outset of greenspace investment it does not actually secure additional finance.

Although a number of overseas examples exist, these are not directly applicable under the current UK local government financing system.

Income generating opportunities, including private sector funding

In these situations, revenue may be generated from the private sector or the general public in return for benefits they receive from greenspace. Income sources from businesses include rent or franchise fees for operating commercial activities within the greenspace (as in some Country Parks, for example), sponsorship or charitable donations, contributions to large scale, structural planting to offset carbon emissions, or the sale of renewable energy from generating facilities built in the greenspace.

Charges to the public may include entry to special features or exhibitions, hire of event space for parties and weddings. Authorised officers of parish and community councils are able under the Clean Neighbourhoods and Environment Act to levy fixed penalty notices for 'environment crimes' such as littering and these could theoretically be reinvested into community facilities.

A notable example of income generated funding is Mile End Park in London, where the London Borough of Tower Hamlets funds 50% of the park's annual maintenance budget requirement from income generating activities within the park, including lease of shop units beneath a land bridge, entry fees from a kart track, café franchises and hiring out pavilions for events.

Endowments

In this case, long term funding is provided for greenspace from investment income earned on assets such as property or shares owned by the local authority or other body responsible for greenspace. Notable examples of this approach include the River Nene Regional Park and The Parks Trust, Milton Keynes.

The Parks Trust in Milton Keynes is an independent charitable organisation that owns and maintains the strategic network of green infrastructure covering around 20% of the area of Milton Keynes. Established in 1992, it is endowed with a commercial property portfolio to generate the income required to cover its operating costs. The Trust works with developers and planning bodies to promote and facilitate the extension of the green infrastructure network as Milton

Keynes expands. The Trust is nominated as the adopting body for all new areas of parkland around the city, using developer contributions which the Trust invests to provide the income to pay for ongoing maintenance. Cost calculations consider the whole life costs of green infrastructure projects, including the eventual replacement of key assets, and administration costs. Further information on the Trust's work is available at http://www.theparkstrust.com.

Voluntary sector involvement

Funding requirements can be reduced by fund-raising activities and by contributions of labour and expertise from not-for-profit organisations and voluntary and community groups. These also foster a sense of local ownership of greenspaces and promote community cohesion. Neighbourhood ownership of greenspaces by non-profit trust organisations is encouraged by Government[60].

Partnership bodies formed between local authorities and not-for-profit organisations can increase access to lottery and regeneration funding whilst charitable status confers tax relief and widens the pool of possible investment sources. Partnerships can also be established with organisations who have specialist knowledge and management skills. For example, the local Wildlife Trust is to manage the community Eco Park at Cambourne, Cambridgeshire.

Appendix 4

National Standards

National Standards that secure quality greenspaces

Natural England believes that providing a network of accessible quality greenspaces is essential to the health and quality of life of people and communities. This can be achieved by delivering greenspaces to:

- Service Standards for core services and facilities for each site type;
- a national Quality Standard, i.e. the Green Flag Award scheme, and;
- an Accessibility and Quantity Standard to ensure provision both close to home and within sustainable transport distances, i.e. Natural England's Accessible Natural Greenspace Standards (ANGSt): Service Standards for Natural Greenspaces

Service Standards

National Nature Reserves

A new framework of service standards for visitors to National Nature Reserves has been developed by Natural England. It particularly targets the most visited sites but is relevant to the majority that are able to welcome visitors for recreation, education or research. It covers 7 standards:

- Accessibility
- Facilities
- Links to local communities
- Links to the wider countryside
- Management
- Activities
- Information and interpretation

For more information on NNRs visit: http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nnr/default.aspx

Country Parks - Accreditation and Affiliation Scheme

The 1968 Countryside Act empowered Local Authorities to call sites Country Parks and empowered the then Countryside Commission to support them.

There are now approximately 430 Country Parks in England and during 2009 Natural England will be rolling out a new accreditation scheme as the benchmark for facilities and services that are expected to be provided if they are to be recognised and use the Country Park 'brand'.

To find out more about Country Parks visit : http://www.naturalengland.org.uk/ourwork/enjoying/places/countryparks/default.aspx

Worcester Woods Country Park (image: Natural England)

Local Nature Reserves (LNRs)

During 2009/10 Natural England aims to revise the guidance on the designation of LNRs and include recommended service standards for visitors to LNRs. LNRs provide access to the natural environment close to where people live and are often managed in close cooperation with local residents. There is a wide range in the quality of management of LNRs but some key factors that help to make them visitor destinations, secure local ownership of a site and active volunteering include:

- An active local community/friends group that supports the reserve
- Junior management groups including WATCH groups
- Ongoing support and training for volunteers from the local authority or responsible management authority (often a County Wildlife Trust)
- A visitor travel plan to secure sustainable access to the LNR
- An access plan that considers the overall physical accessibility of the site for all users
- A visitor and education access plan that considers the diversity of it's local community and potential visitor audience

Further guidance on this and other aspects of LNRs is available at: http://www.naturalengland.org.uk/ourwork/enjoying/places/lnr/default.aspx

Quality Standard - The Green Flag Award Scheme

(including the Green Pennant and Green Heritage Awards)
Started in 1998, this award has become accepted as the recognised national benchmark standard for the best quality greenspaces in terms of the facilities and services they offer visitors. It can be awarded to any type of greenspace. Natural England endorses the Green Flag Award Scheme.

The scheme is based on scoring against a set of criteria that measure both the physical quality of the site as well as the service delivered to the community, how the site is promoted and its environmental sustainability.

The Award Scheme does not attempt to assess the overall quality of greenspaces within a local authority area. A number of authorities and consultants are however, using the criteria within the scheme to set up their own methodology of measuring quality across their greenspace assets. The overall quality of the service provided by the management authority is not assessed except in relation to the sites put forward for the scheme but there are other performance management tools such as TAES (Towards An Excellent Service) that can do this. Guidance on TAES is provided by CABE Space.

There are many examples of Country Parks, LNRs and some NNRs that have achieved the Green Flag or Green Pennant Award. Along with further information about the scheme, these can be viewed at: http://www.greenflagaward.org.uk/

Appendix 5

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