Natural England Green Infrastructure Principles (Detailed version, date January 2023)

Contents

Principle Why 1 - Nature rich beautiful places

GI supports nature to recover and thrive everywhere, in towns, cities and countryside, conserving and enhancing natural beauty, wildlife and habitats, geology and soils, and our cultural and personal connections with nature.

Description - what the principle is about

Despite some gains, overall biodiversity loss has been accelerating in recent years in England. Habitats are becoming more fragmented, and many individual species are in decline. Soil loss and degradation through agriculture, neglect, and damage to sites with important geological and fossil records and mineral extraction are causing an overall loss to geodiversity. There is a recognition from government and across the environmental sector that action at both broad landscape and local scales is required. This means that implementation needs to go beyond protected sites to increase biodiversity and geodiversity wherever it can be helped to flourish. Planning GI in a strategic way should therefore seek to identify locations where individual gains can be made in areas where provision is poor and there is a need, even if this does not complement existing protected sites. There is also a recognition that biodiverse environments are the foundation for the flow of other GI benefits and cannot be planned or managed in isolation from other GI benefits. Therefore, the design and implementation of GI should achieve a measurable increase in biodiversity through the creation, restoration, enhancement and connectivity of new and existing habitats and sites.

Biodiversity Net Gain (BNG) – an Environment Act requirement for new development to deliver a minimum 10% increase in biodiversity after development, compared to the level before, can provide an investment mechanism for both on-site and off-site GI. This can be achieved by either enhancing existing habitats or creating new ones. BNG can therefore be used to both raise the quality of existing green and blue spaces (such as river restoration) and provide new GI. Where Habitats Regulation Assessments are undertaken these will also offer opportunities for new or improved GI. For example, where Suitable Alternative Natural Green Space (SANGs) are required as buffer zones to prevent damage to Special Protection Areas (SPAs).

Local Nature Recovery Strategies will also be used to identify how habitats can deliver wider environmental benefits, which may also improve people's access to GI.

Urban landscapes can be rich in wildlife and help support nature's recovery. Significant amounts of wildlife-rich habitat exist in Local Nature Reserves, that are often within or close to urban settings. These areas provide important GI for local communities and can support rare as well as common species. Urban areas are particularly important for pollinators and relatively small areas of habitat such as green roofs can be important especially in combination with public parks and private gardens which are managed for wildlife. Welcoming nature rich spaces can also be crucial in raising awareness and appreciation of what other benefits GI can offer.

Native species will inevitably be important, however creating beautiful places especially in an urban context where the diversity of trees, shrubs and plants enrich townscapes, non-native species will be vital. Many gardens mimic a dynamic woodland edge habitat, replicating the succession between meadow through tall herbaceous vegetation to scrub and high canopy. This is a highly energised habitat with a large diversity of non-native plants. Historic public parks and cemeteries were also planted with a rich palette of trees from around the world to create interest. The treescapes of many Conservation Areas are also notable along with allotments, orchards, and fruit trees all of which make a huge contribution but are often non-native species.

GI can create the opportunity to strengthen a communities' connection with its surroundings regardless of background or experience. There can be strong cultural associations with nature whether they are based on common insects in an area noted by long standing residents, or the comparative reflections of recent arrivals to a location which has plants familiar from another country. These historical and cultural links can be used as an alternative/additional hook for creating connections, including with traditionally hard to reach communities. Nature on the doorstep can also enable children to connect with nature in the everyday journey to school or in their leisure activities.

To achieve nature rich and beautiful places at a strategic level, GI should:

- Create and strengthen networks of habitats and reduce fragmentation
- Help deliver Biodiversity Net Gain requirements
- Contribute to cross species objectives such as pollinator strategies
- Integrate with Local Nature Recovery Strategies and seek to contribute to the Nature Recovery Network and contribute to national target to create and restore wildlife rich habitats and to protect at least 30% of land.
- Help achieve targeted individual species recovery
- Maintain and enhance geodiversity assets
- Prevent and reduce soil degradation and loss
- Be designed to deliver multiple benefits including landscapes that have a distinct sense of place

To achieve nature rich and beautiful places at a local level GI should:

- Thread biodiversity through the built environment connecting recreational, natural green and blue spaces
- Prioritise native species

- Be designed to connect people to nature
- Contribute to site specific biodiversity net gain requirements

To create accessible nature rich spaces close to where people live and work, GI policies and implementation plans should aim to take account of evidence on the levels of use and quality of access to green space. This should include mapped sources of information which can allow application of appropriate standards to quantify deficits and identify priority locations for nature related GI investment.

Good GI needs a strong sense of place to encourage ownership and belonging. For the public to understand and support management of GI for biodiversity and geodiversity, public engagement, which may include information provision and education, is key. The GI provider needs to understand historic management practices, significant plants, animals, and geology so that future management of GI reflects local cultural connections.

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Principle Why 2 - Active and healthy places

Green neighbourhoods, green / blue spaces and green routes support active lifestyles, community cohesion and nature connections that benefit physical and mental health, wellbeing, and quality of life. GI also helps to mitigate health risks such as urban heat stress, noise pollution, flooding, and poor air quality.

Description - what the principle is about

England is suffering a health crisis with diabetes, obesity, dementia and mental health issues rising unevenly across the population. Faced with these challenges, as well as those from Covid-19, there is an increasing focus not just on treating conditions, but also on prevention. Changing lifestyles and increasing healthy behaviours particularly physical activity, is seen as critical in helping people live more independent lives for longer. There is recognition across the health sector that outdoor activity in nature rich spaces can be an alternative or positive complement to other treatments. This applies to mental as well as physical health conditions and can be supported by green social prescribing, which involves referring patients to take part in nature-based activities, such as, walking and cycling, community gardening, food-growing projects, and practical conservation tasks such as tree planting. In a number of studies, access to green space has been associated with improved relaxation, increased functioning of the immune system and better sleep patterns.

Evidence that people in more affluent socio-economic groups generally visit the natural environment much more often than less affluent groups including some black and minority ethnic groups, those with a disability or long-term illness is well established. Often economically disadvantaged communities who have poorer health and educational outcomes do not have access to good quality natural green or blue spaces close to where they live or work. Health inequalities are also often compounded by poor housing, higher rates of crime, a lack of places for play and higher risks due to traffic. Due to population density, people on lower incomes can also have to share green spaces with high numbers of people, making restorative or contemplative experiences more difficult. People on lower incomes may also not have the resources to visit green spaces that are not close to home. Therefore, to be effective in addressing health needs, green and blue spaces need to be close to where people live and work, be good quality, safe, welcoming, provide the necessary facilities and be well-maintained.

Children are key GI users and are a major concern in terms of rising obesity levels. Offering safe routes to school and doorstep play opportunities as part of GI planning can help address these issues.

Paths alongside rivers, canals and lakes often act as routes for walking and cycling and therefore help to support active lifestyles. Living near or visiting the coast or rivers and lakes increases people's self-reported levels of mental health and wellbeing. Overall green and blue spaces can have a positive impact on preventing health issues through

providing opportunities for sport and more active and healthy lives. GI can also supply other health benefits by helping to address some of the environmental causes of poor health, such as poor air quality, by filtering particulates, and reducing urban summer temperatures by cooling the air.

Parks, open spaces, nature areas, lakes ponds and rivers are the places where many people seek tranquillity and a chance to escape the pressures of everyday life. Planning GI should therefore take account of the need for passive buffering and creating smaller peaceful spaces. Also, the introduction of expansive spaces where it is possible to be removed from everyday noise. Therefore, GI implementation should not always be about intensifying use and maximising activity.

Heritage values are often the catalyst for visiting, enjoying green spaces, engaging with others and getting involved. The historic public parks were designed for fresh air, recreation and exercise; and their creation and other spaces such as cemeteries were about improving the health of communities and sanitation. Returning to these historic values offers the potential for addressing similar modern day health issues.

Formal sports provision will likely from a part of GI planning. Assessments of need and development of strategies for formal sport/playing fields will need to be carried out separately to define needs and opportunities. In this regard data such as user surveys can supplement mapped information to cover the breadth of physical activity.

To achieve active and healthy places at a strategic level, GI should:

- Reflect public health authority, health leads, Health and Wellbeing Boards, Integrated Care Boards and Integrated Care Partnerships, strategic priorities.
- Help achieve area wide specific health targeting for particular illnesses and goals such an increase in social prescribing.
- Align with health funding and support which can also deliver GI.
- Align with active travel plans

To achieve active and healthy places at a local level GI should:

- Maximise health and wellbeing outcomes particularly in deprived areas and for disadvantaged groups.
- Address issues of inequality in access to quality natural green space and routes, using the Accessible Natural Greenspace Standard (AGS).
- Be manged to deliver indirect benefits such as urban cooling, noise reduction, flood risk management and air quality improvements which can improve health outcomes.

To create opportunities for healthy active lifestyles close to where people live and work, GI policies and implementation plans should aim to use evidence on access to green space and the need for active travel routes. This should include mapped sources of information which can allow application of appropriate standards to help quantify deficits and identify priority locations for health-related GI investment. Partnership working between green space managers and waterways managers, transport and health professionals should then form part of successful GI planning and delivery.

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Principle Why 3 - Thriving and prospering places

GI helps to create and support prospering communities that benefit everyone and adds value by creating high quality environments which are attractive to businesses and investors, create green jobs, support retail and high streets, and to help support the local economy and regeneration.

Description - what the principle is about

In the context of growing urbanisation, people have grown distant from nature despite the fact that our economies, livelihoods, and well-being all depend on it. Our unsustainable engagement with nature is endangering the prosperity of current and future generations. The solutions start with understanding and accepting that our economies are embedded within nature, not external to it and investing in nature will ultimately repay society with dividends.

Placing accurate economic values on green infrastructure is therefore vital and will help to support the case for sustained investment. For local authorities and statutory bodies high quality environments with natural green spaces and attractive settings can encourage inward investment. This in turn can support retail and high streets, incorporate green forms of transport, create inviting and distinctive workplaces, reduce flood risk and the impact of climate change, and provide space for renewable energy generation.

For residents, workers and businesses high quality environments can be a catalyst for regeneration and community ownership, a focus for education, training and volunteering and stimulate job opportunities by attracting investment and tourism. There is evidence that spending time in green space can also benefit employees and students as it is associated with improved motor skills, better academic performance, and increased concentration.

GI can also provide additional 'green jobs'. The range can be from highly specialised experts in ecology, practical implementation such as green roofs and employment from the products of land including food production and forestry. There is a clear link between jobs and skills to manage and maintain spaces and places, from local neighbourhood streets to specific spaces such as parks and river corridors. There is huge scope to raise urban street management so that spaces and places are managed well for nature. Although often dispersed compared to manufacturing or retail, jobs from GI can amount to a significant pool of skills and income.

Quality green space can have a positive impact on creating settings for investment and acting as a catalyst for wider regeneration. Property owners and businesses place a higher value on properties close to green and blue space. Developers have used GI to add value to projects and differentiate their brand in the marketplace. Selling points have focused on operational savings associated with lower building heating and cooling costs for businesses; more appealing landscape elements; opportunities for recreation; climate resilience and strengthened sense of community. Heritage has an important role in supporting regeneration. The histories of most public parks and

designed landscapes are intertwined with the past growth and development of our towns and cities. Heritage and GI can work together to increase prosperity. Particularly in area-wide regeneration projects and individual development proposals. This means that it can often be useful to gain heritage expertise as part of GI planning.

Creating connectivity and spreading the benefits through networks rather than high investment in individual sites can be an important in ensuring the economic benefits of GI are more evenly available particularly for those in densely populated areas.

To achieve thriving and prosperous communities at a strategic level GI should:

- Be a central objective within plans and policies for new development and regeneration
- Address gaps or pinch points where GI demand is not being met and development can contribute to the supply
- Provide opportunities for investment from a broad range of businesses and investors
- Enable opportunities for collaboration between Business Improvement Districts (BIDs), Local Enterprise Partnerships (LEPs) (or devolved administrations where LEPs have transitioned into devolved structures), and other strategic economic bodies on integrating GI into economic plans and proposals
- Maximise economies of scale for projects through funding mechanisms which can pool resources for landscape or largescale projects

To achieve thriving and prosperous communities at a local level GI should:

- Integrate services such as air quality regulation, flood risk management, noise mitigation, recreation, urban cooling, and pollination into development based on local needs
- Use early collaboration with adjacent local authorities, other developers, landowners, or infrastructure providers to create opportunities for jointly funded GI
- Link to skills development, training and jobs by local employers, contractors, and training institutions

Returns on green and blue infrastructure investment can be high, and in turn increase the scope for levering in private sector investment. Using planning powers, innovative payments and joint funding streams are key elements which can enable GI to bring regeneration and prosperity.

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Principle Why 4 - Improved water management

GI reduces flood risk, improves water quality and natural filtration, helps maintain the natural water cycle and sustainable drainage at local and catchment scales, reducing pressures on the water environment and infrastructure, bringing amenity, biodiversity, economic and other benefits.

Description - what the principle is about

Green infrastructure can have a strategic and local role in sustainable water management. Planned and delivered correctly GI can greatly reduce the speed and volume of water reaching drains, sewers, and watercourses, reducing the risk of flooding and storm overflow spills, putting that water to beneficial use. Nutrient neutrality is a term used to describe a development which does not add to existing nutrients in water courses. GI can improve natural processes of water filtration, recharging groundwater rather than that water ending up in drains. GI can also play a vital role in improving water quality, for example by introducing vegetation which can help trap, filter out or reduce contaminants released to the environment. Supporting this the Environment Act places duty on water companies to collaborate on joint water management plans and sewerage undertakers will need to prepare drainage and sewerage management plans giving an opportunity to influence water quality and blue-green infrastructure.

The recreational benefits of blue infrastructure are also important aspects of GI. These can range from simple waterside access for walking and angling, to active sports such as swimming, sailing, and canoeing and their associated facilities. Likewise, biodiversity, water, and GI link together to provide habitat and ecological connectivity for wildlife. Including important locations for migratory fish and birds in their life cycles and journeys across continents. The variety of uses that water can be put to can lead to potential conflicts. GI can be useful in resolving these as a multidisciplinary inclusive approach is usually needed in planning GI due to the breadth of issues it covers.

Sustainable water management through GI can also lead to improved community resilience in the face of climate change supporting adaptation in the face of too much or too little water. Taking a catchment-based approach can help build GI networks, allowing local blue-green infrastructure assets to link to larger watercourses and rivers. This can generate cumulative benefits connecting these to larger landscape scale features beyond. Therefore, at all scales sustainable water management can be integrated into multifunctional corridors and networks of green and blue infrastructure.

Sustainable Drainage Systems or SuDS are a way of managing water using or mimicking natural processes. SuDS copy nature in urban environments by holding back rainwater where it falls or letting it soak into the ground, instead of letting it run off hard surfaces like pavements and car parks straight into sewers. This approach can enable developments to include green roofs and walls, rain gardens, swales, ponds, and

various other water retention features. These measures are capable of slowing the water flow, bringing rain and greywater into use, creating new habitats, reducing water pollution, and enhancing and creating recreational opportunities. SuDS work best when planned in and integrated as part of a GI from the outset within new developments but can also be retrofitted.

This can help strengthen local and wider GI networks allowing small water based or SuDS assets within sites to be linked to larger landscape scale features beyond. Introducing a SuDS based approach within existing developments is far more challenging and integrated systems can be functionally harder to achieve and need to fit with the existing historic and landscape character. This means a long-term vision with a view to identifying opportunities and achieving benefits over time is needed.

To achieve sustainable water management at a strategic level GI should:

- Be based on an understanding of current and future catchment processes and needs and establish strategies for GI to respond to these needs at this scale
- Contribute to the delivery of water management plans, including

River Basin Management Plans, Drainage and Wastewater Management Plans and Surface Water Management Plans

- Aim to reduce flooding risks identified in Strategic Flood Risk Assessments through nature-based solutions
- Provide and improve water to create and connect new or enhance existing wetland habitats and watercourses
- Protect and improve the quality of surface water and groundwater, including by reducing pressure on water infrastructure
- Improve Climate Change Resilience of freshwater habitats and species

To achieve sustainable water management at a local level GI should:

- Provide sustainable water management including though sustainable drainage systems (SuDS)
- Be adaptable to take account of the impacts of climate change
- Reduce site specific flood risks identified in flood risk assessments
- Improve water quality and help address existing sources of pollution
- Improve natural filtration where this will protect and enhance groundwater supplies

- Help connect recreational, natural green and blue spaces and provide opportunities for everyone to safely experience blue space
- Use water to enhance public open space for a variety of recreational uses, ensuring potential conflicts are managed
- Create and enhance habitats including re-naturalising river corridors and providing riparian buffer zones
- Soften estuary edges with coastal habitats that can act as buffers to coastal erosion and tidal flooding
- Prioritise native species and ensure biosecurity principles are adhered to avoid spreading non-native invasive species and diseases.

To lock in benefits, responsibility for long term maintenance of SuDS must be secured at the outset.

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Principle Why 5 - Resilient and climate positive places

GI makes places more resilient and adaptive to climate change and helps to meet zero carbon and air quality targets. GI itself should be designed to adapt to climate change to ensure long term resilience.

Description - what the principle is about

As the climate changes, more extreme weather events are expected. Flash flooding, heat waves, high winds, sea level rise and disruption to transport and communication networks are likely to be more frequent and severe. Places which both contribute to the mitigation of the effects of climate change and are able to adapt to its predicted consequences over time can be described as climate positive. Green and blue infrastructure can be designed, implemented, and managed to help mitigate and adapt to these climate challenges. These interventions can reduce the impact on both wildlife and human populations, fostering resilience and low carbon behaviours.

In the built environment GI can have a strong role in carbon sequestration and reducing CO_2 emissions through low carbon approaches to design, construction, and long-term maintenance. Renewable energy generation (e.g., ground-source heat pumps) can be incorporated into green and blue space. Gardens, green roofs, and rain gardens can contribute to flood water management. Many GI interventions can support more than one climate change objective.

There is a strong interrelationship between GI and managing water. Tree planting, street trees, green roofs, and other permeable vegetated surfaces such as open spaces, all play a role in water management, therefore considering how water interacts with GI is crucial. GI also has a strong relationship with travel. Attractive cycling and walking networks as part of GI corridors can contribute to CO_2 reduction by providing active travel options. Waterways can also play a role in the provision of thermal energy for heating and cooling systems.

Strategic tree planting can provide carbon storage and flood water management. GI particularly through trees providing shade and evapotranspiration can help reduce day time temperatures in urban areas and provide health benefits by cooling during heat waves. Trees which give shade to buildings can also reduce need for air conditioning, saving carbon. Trees can also play a vital role in improving air quality by reducing pollution through absorbing harmful gases and particles in the air. Blue spaces such as ponds, lakes and rivers can also have a cooling impact and reduce urban temperatures in particular.

Measures to adapt to climate change can also create significant opportunities to provide biodiversity benefits. For instance, providing refuges and corridors for climate sensitive species within the landscape and individual sites.

Local communities can get directly involved in climate related GI projects, including tree planting and maintenance, with local engagement a vital element of many successful approaches to GI and climate change.

To achieve resilient and climate positive places at a strategic level GI should:

- Be developed in collaboration with key stakeholders to meet national climate change objectives
- Take account of and be planned to respond to the long-term climate change projections in the area
- Contribute to water and transport strategies, policies, and plans

To achieve resilient and climate positive places at a local level GI should:

- Be audited using local information for instance using local resilience strategies and plans to improve the climate resilience of existing GI
- Incorporate adaptive management to ensure GI is planned to provide multi-functional benefits and continues to do so as the climate changes

In urban areas where GI maybe more limited, policies and implementation plans for new private and public development should be informed by using local audits. This information can then be used to set local standards to achieve climate change adaption and mitigation through increased GI.

The role of GI in helping to deliver zero carbon targets, managing flood risk and urban cooling makes it a very attractive long-term policy and delivery option. Policy and decision makers should make sure they use GI as a key tool across the board when addressing climate change.

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Principle What 1 - Multifunctional: GI delivers multiple functions and benefits

GI should deliver a range of functions and benefits for people, nature and places, address specific issues and to meet their needs. Multifunctionality (delivering multiple functions from the same area of GI) is especially important in areas where provision is poor quality or scarce.

Description - what the principle is about

Green infrastructure is often described in terms of the functions it performs such as improving air quality and the associated benefits it brings as a result, such as improved health outcomes. The goal of good green infrastructure should be to achieve multifunctionality. The extent will depend on local circumstances and priorities but, planning for and delivering a measurable increase in multiple benefits, should always be the goal.

Now and looking forward society faces critical challenges such as biodiversity loss, inequalities in health, wellbeing, and climate change. Multifunctional GI can assist in responding to these challenges in a joined up way. Considering the benefits of good Green Infrastructure can help guide thinking towards achieving multifunctionality. Often this can be a case of bringing together policy makers, practitioners, existing and potential users. The main threats and benefits to consider are:

- Thriving nature and biodiversity gains: Habitat and species loss has resulted in a decline in biodiversity. Good GI can include new and enhanced areas for nature, both wildlife and geodiversity. Also, the design of buildings and spaces can allow plants to colonise and animals to use them, helping to create nature rich places.

- Climate change resilience, water management and meeting zero carbon targets: As the climate changes, the UK is predicted to experience more extreme weather events. Urban areas are already affected by flash flooding and heat wave events. GI designed, implemented and managed to provide natural solutions can reduce the impact of severe weather events, help wildlife move and adapt. GI can also reduce carbon emissions through interventions such as, renewable energy generation e.g., ground-source heat pumps or bioenergy.

- Health and wellbeing benefits: Access to nature rich green and blue spaces has a positive impact on health and wellbeing. Often poor communities with poorer health and educational outcomes have the lowest levels of access to nature. Access to good quality parks, green and blue spaces can ensure that most people can gain mental health benefits from experiencing nature. Active travel routes for walking, cycling and horse riding can lead to physical health benefits from more active lifestyles.

- **Supporting prospering communities**: High quality environments with natural green spaces are attractive to people and businesses. Green infrastructure can support a shift to a decarbonised green economy, aid regeneration and add value to economic activity.

At a project level multifunctional GI can offer an alternative to more traditional heavily engineered single focus solutions. For instance, stormwater drainage has generally been designed to move excess rainfall from urban areas as quickly as possible. A GI approach incorporating living roofs, large trees, soft landscape areas and a network of street swales can slow the flow and safely manage large volumes of water providing effective flood protection. But such projects can also achieve multifunctionality by providing areas for recreation and wildlife within the water management features. The water management features themselves can also achieve even wider gains. Living roofs can insulate buildings and large trees shade offices, which reduces the need for air conditioning. All this adds up to multifunctional GI.

At a strategic level GI should achieve multifunctionality by:

- Combing evidence from a broad range of sources
- Highlighting how enhancements can be delivered across relevant strategies and delivery plans
- Identifying inequalities in provision which need addressing
- Bringing together expertise and ensuring that goals are shared by stakeholders
- Being planned as network of features which work together in combination and across areas

At a local level GI should achieve multifunctionality by:

- Involving beneficiaries across different user, age, and socioeconomic groups
- Creating accessible nature rich spaces close to where people live and work
- Ensuring spaces are adaptively managed to provide multiple benefits over time
- Capturing the multi-functional benefits of green infrastructure using appropriate qualitative and quantitative assessments or tools

Overall addressing needs through multifunctionality is at the heart of good GI and what makes it different from traditional grey infrastructure, which it can be combined with to bring wider benefits.

Supporting evidence

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IPCC (no date) *Sixth Assessment Report.* Available at: *www.ipcc.ch/assessment-report/ar6/*

Lovell, R., White, M.P, Wheeler, B. Taylor, T., and Elliott, L. (2020) *A Rapid Scoping Review of Health and Wellbeing Evidence for the Framework of Green Infrastructure Standards NEER015.* European Centre for Environment and Human Health, University of Exeter Medical School. For: Natural England, Department for the Environment, Food and Rural Affairs, Public Health England, and Ministry for Housing, Communities and Local Government, England. Available at: A rapid scoping review of health and wellbeing evidence for the Framework of Green Infrastructure Standards - NEER015 (naturalengland.org.uk)

Rolls, S. and Sunderland, T. (2014) *Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2).* Natural England Research Reports, Number 057. Available at: Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2) - NERR057 (naturalengland.org.uk)

Lusardi, J., Rice, P., Waters R.D., and Craven J. (2018) *Natural Capital Indicators: for defining and measuring change in natural capital.* Natural England Research Reports, Number 076. Available at: ***Natural Capital Indicators: for defining and measuring change in natural capital (NERR076)***

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Principle What 2 – Varied: GI includes a mix of types and sizes that can provide a range of functions and benefits to address specific issues and needs

Varied: GI should comprise a variety of types and sizes of green and blue spaces, green routes, and environmental features (as part of a network) that can provide a range of different functions, benefits and solutions to address specific issues and needs.

Description - what the principle is about

By its nature, good GI is multifunctional and therefore varied. However, being multifunctional alone, does not mean that GI will always address local and strategic needs. This is because a diversity of solutions can be needed to solve a specific issue. This can be connected to the scale or hierarchy of provision. In sport terms this might mean a 'kick about' space in the estate, a 5- a-side pitch in the local green space, a Sunday league ground in the district park, and a sports stadium to serve the settlement. It might also relate to the same group of people whose aspirations differ or change over time. In the case of children's outdoor play, this comes in many different forms - active group play, exploring nature, imaginative play, using fixed play equipment, cycling, skateboarding, sitting and talking or playing card games etc. The type of play changes as children become older and children with disabilities will have some different requirements. Therefore, providing one set of facilities such as swings and a roundabout will not meet their needs.

GI solutions can also address the same issue in different ways. GI can be intensely managed or more natural; it can also comprise a series of smaller connected private spaces such as domestic gardens, or one large public space such as a city park. Research using health related evidence has highlighted how a variety of green spaces in a neighbourhood can have a positive impact on people's wellbeing.

Variations in predictions over climate change mean that there is a lack of certainty over to what extent, how and when species may have to migrate and/or adapt to survive. Therefore, planning and targeting interventions to achieve a variety in the location and type of habitats, is likely to provide the best long-term solutions and reduce the risk around climate change assumptions. A mosaic of habitats can often deliver structural diversity, provided the spaces are large enough and linked with other similar areas for wildlife. This concept of ecological stepping stones provides an illustration of variety on a landscape scale. Accessible geodiversity can further enhance community connections to the past and the processes that have shaped the character of their local environment.

Nature-based Solutions or protecting, restoring, and better managing ecosystems for the benefit of people and biodiversity, gives the framework to tackle the twin climate and nature crises in an integrated way. A key element is implementing the right land use in the right place, for example, planting trees on peatlands where they would not naturally have occurred is likely to lead to a net increase in emissions of greenhouse

gases. Therefore, achieving a varied landscape should be set in the context of wider objectives to avoid unintended consequences.

This means that the planning and implementation of GI needs to aim for a measurable increase in variety through the creation, enhancement, and connectivity of new and existing GI. This variety should be benefits-based to meet existing social, economic, and environmental policy objectives.

At a strategic level GI should:

- Aim to create variation in the types and sizes of spaces to meet strategic needs
- Strengthen networks and their variety to create more interest for users
- Maintain and enhance a mix of significant GI assets
- Reduce the loss and degradation of habitats and geodiversity
- Increase the diversity of habitats and species
- Reduce the loss of and increase the variety of recreational facilities

At a local level GI should:

- Thread different types and sizes of spaces through local GI networks
- Create a variety of habitats and facilities to supplement larger initiatives
- Aim for variation in the density and layout of GI
- Be clearly defined in terms of purpose and characteristics

Aiming for variety also has the added benefit of creating the right conditions for the wider involvement of interest groups and individuals in the planning and delivery of GI.

Supporting evidence

Monteiro, R., Ferreira, J.C. and Antunes, P. (2020) 'Green Infrastructure Planning Principles: An Integrated Literature Review'. *Land* 2020, 9, 525. Available at: Green Infrastructure Planning Principles: An Integrated Literature Review (mainstreaminggreeninfrastructure.com)

Government policy and guidance

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Ministry of Housing, Communities & Local Government (2021) *National Design Guide.* Section N1. Available at: National_design_guide.pdf (publishing.service.gov.uk)

Principle What 3 - Connected: GI connects as a living network for people and nature at all scales, connecting provision of GI with those who need its benefits

Connected: GI should function and connect as a living network for people and nature at all scales (e.g., within sites; and across regions/ at national scale). It should enhance ecological networks and support ecosystems services, connecting provision of GI with those who need its benefits.

Description - what the principle is about

Many towns and cities in England include a lattice of trees, parks, gardens, allotments, cemeteries, woodlands, rivers, and waterways set within and between urban areas. However, these green and blue assets may not be well connected and sometimes their potential to deliver critical environmental, social, and economic benefits has gone unrealised.

When improvements have been made often resource constraints have meant these have happened in isolation on individual sites at different times. Ecosystem services and benefits to people provided by nature including, provisioning services (e.g. food, water, wood, construction materials), regulating services (e.g. water quality, flood regulation, erosion protection, carbon storage, noise reduction, air quality regulation, cooling and shading), supporting services (e.g. habitats, thriving plants and wildlife, pollination), and cultural services (e.g. access to nature, sense of place, aesthetic value, recreation and education) have not been considered as working in combination and as part of a local or strategic networks. This means that GI has been dealt with in a fragmented way and not viewed as a functioning network. Opportunities to integrate GI together into core elements of new and existing grey infrastructure have therefore been missed.

In order to create multifunctional living networks of GI, strategic and long-term planning is required. This can ensure that green infrastructure assets connect across wide areas from urban through to rural. This can enable the movement of people and wildlife through green and blue networks and protect and enhance existing natural features. Positive planning can create new GI designed to help improve placemaking enabling settlements to grow and adapt in a connected way. These improvements can address deficits in and increase the quantity and quality of a range of ecosystem services. To achieve this, understanding what GI assets there are, what condition they are in, what benefits they provide and how these do, or could work as networks is essential. Working at a network scale will necessitate wider engagement, partnerships, and interdepartmental working to gain an overview and vision. Benefits might be enhanced health and wellbeing, cleaner air, active travel, and local food production. Developing and maintaining interconnected healthy ecosystems for people and nature is a foundational principle for green infrastructure.

GI may sometimes need to be considered in different ways for people and wildlife. For humans, connectivity is more likely to mean continuous corridors where sites are next to each other and physically connected. For wildlife requirements might mean that this is less necessary or desirable particularly for airborne insects, birds, and mammals where sites can be separate on the ground, but near enough together to create connected routes and stopping off points.

At a strategic level GI should:

- Achieve a measurable increase in ecosystem services through the creation, enhancement, and connectivity of new and existing sites
- Identify and describe how investment will form an integrated network to provide multiple benefits, including for: active transport; wildlife; flood reduction; urban cooling; carbon storage; pollination and improvements in air and water quality at a strategic scale
- Use up to date information on the quality and condition of open space and natural capital assets to establish connections across stakeholder interests that will make GI planning more effective and integrated
- Be clear where and how GI needs enhancing, who it benefits and inequalities in provision which need addressing
- Demonstrate how land allocation and regeneration priorities connect and contribute to the delivery of GI,
- Show how and where the mix of GI functions and services are provided and relate to each other as part of a network
- Provide strong policy protection for the existing GI network

At a local level GI should:

- Be informed by mapped information which identifies different existing GI assets, and shows where the assets link together at a local and strategic scale
- Be grounded in local information which informs planning and design
- Focuses on needs based on addressing deficits in local Green Infrastructure supply
- Ensure the functions and services provided by individual projects meet the needs of users, benefits the wider environment, connects to GI networks within the boundary of the project and links with existing and planned GI in the surrounding area

At a settlement level GI should be assessed to understand how it works together as a system to provide multiple ecosystem services and benefits. Including how all the

various parts do or could connect into networks that provides different benefits for people across a community.

For networks of GI to be delivered strong partnerships, a clear vision and understanding of what can be achieved over time is required. In addition, for GI strategies to be successfully achieved cooperation between landowners, developers, policy planners, development control planners, health and other specialists, designers, and communities is normally required.

Supporting evidence

Landscape Institute (2009) *Green Infrastructure: connected and multifunctional landscapes.* Available at: GreenInfrastructurepositionstatement13May09.pdf (engageliverpool.com)

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Ministry of Housing, Communities & Local Government (2021) *National Design Guide. Movement Chapter.* Available at: National_design_guide.pdf (publishing.service.gov.uk)

HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment.* Chapter 3. Available at: 25-year-environment-plan.pdf (publishing.service.gov.uk)

Principle What 4 - Accessible: GI creates green, liveable places where everyone has access to good quality green and blue spaces routes and features

GI should create and maintain green liveable places that enable people to experience and connect with nature, and that offer everyone, wherever they live, access to good quality parks, green spaces, recreational, walking and cycling routes that are inclusive, safe, welcoming, well-managed and accessible for all.

Description - what the principle is about

Green infrastructure provides green spaces and pathways for recreation, exercise, informal and organised sports, and active travel. GI can also improve the quality of streets and routes for pedestrians, cyclists, and horse riders. There is evidence that having many natural features within a neighbourhood encourages walking trips to destinations such as shops. When, how and who uses green infrastructure is greatly affected by how near it is, how well it meets users' needs and how well it is managed. Certain types of routes such as multi-user routes in the urban fringe and short circular routes for exercise close to where people live, can be important in connecting people and places, and supporting healthy communities. In principle access to GI should start from considering the widest range of users and ensure that no one is excluded. However, the interaction of different goals, can lead to conflicts between conservation and access or between leisure use and active travel (a new surface might lead to faster cycling and therefore more conflict with dog walkers). Sensitivity to community concerns is key while striking a balance with strategic objectives. Often relatively small changes to the environment can have a large impact on how often and how spaces are used. Dropped curbs, the correct surface to use, the width of a cycle ways/ path for both traditional bikes and accessible bikes can all make a considerable difference.

Considering gaps in the existing rights of way network and what facilities users need to access it, can be a useful starting point for considering the role of GI. Therefore, well designed, accessible, and cared for spaces and routes close to where people live are most likely to:

- Respond to the needs of less mobile users and those with long term health conditions
- Encourage inclusive use and consider the needs of different under-represented groups including older people, people living with disabilities, low-income families, and people from ethnic minority backgrounds.
- Feel safe for all non-motorised users

- Overcome barriers particularly through inclusive detailed information and design
- Offer opportunities to interact with the natural world for recreation, education, or relaxation
- Connect different communities together
- Support local community pride and cohesion

Green infrastructure which simply provides a green backdrop to movement routes, such as mown grass verges will be less likely to provide a range of experiences and therefore benefits. Transport routes which include recreational opportunities and natural areas will raise the quality, attractiveness, financial and social capital of an area. When considering GI planning it is important to recognise that accessibility is about safety, practicality, timing, and affordability as well as proximity and as such mapped information on the location of sites should be supplemented by quality and user information. GI can also have a role in providing alternative routes which divert the public away from sites with sensitive wildlife and so assist their protection.

At a strategic level GI should:

- Strengthen access networks and reduce fragmentation of green and blue infrastructure
- Contribute to access policy such as green transport and active travel strategies
- Help achieve targeted individual access objectives for different users
- Maintain and enhance non-motorised routes
- Provide data and evidence to promote the strategic planning of inclusive, safer, and longer routes

At a local level GI should:

- Thread non-motorised access routes through the built environment connecting recreational, natural green and blue spaces
- Ensure GI assets such as parks are accessible for all
- Maintain and enhance safe routes which can be used by the public for educational access, recreation, and travel to work
- Provide information at a local level, in different formats which respond to the needs of different users, encourages the use of green and active transport and links to health outcomes.

- Seek to provide associated infrastructure such as seating, bike racks, disabled parking etc which supports accessibility
- Provide clear guidance on accessibility requirements for new or redeveloped GI

To create opportunities for green liveable places, GI policies and delivery plans should aim to use evidence on access to greenspace. Then apply appropriate standards to help quantify deficits and identify priority locations for GI investment. This will ensure that GI is inclusive, accessible and provides spaces and routes for all local people and visitors including people with disabilities and long-term health conditions, walkers, cyclists, and horse riders. In terms of delivery specific local government powers exist to implement improved GI e.g., to create rights of way and country parks.

Supporting evidence

Public Health England (2020) *Improving access to greenspace: a new review for 2020.* Available at: Improving access to greenspace: 2020 review (publishing.service.gov.uk)

Government policy and guidance

Ministry of Housing, Communities and Local Government (2021) *National Planning Policy Framework.* Chapter 8. Available at: National Planning Policy Framework (publishing.service.gov.uk)

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Ministry of Housing, Communities & Local Government (2021) *National Design Guide.* Sections 91 and 102. Available at: National_design_guide.pdf (publishing.service.gov.uk)

HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment.* Goal 6. Available at: 25-year-environment-plan.pdf (publishing.service.gov.uk)

Principle What 5 - GI should respond to an area's character

GI should respond to an area's character so that it contributes to the conservation, enhancement and/or restoration of landscapes; or, in degraded areas, creates new high-quality landscapes to which local people feel connected.

Description - what the principle is about

Character gives an area a sense of place; it helps people to recognise and connect to their local environment. 'Landscape character' embraces the natural, cultural, and perceptual aspects of landscape, and how they interact to make a place distinctive.

Taking steps to understand an area's landscape character is essential to ensure that new Green Infrastructure responds to a place appropriately. This requires taking account of information about local landscape character and key characteristics. Historic and cultural associations also form part of the character of a place and often bind a community to the location. This might be an industrial past which affected the landscape or key events which might be commemorated by man-made features.

The GI approach to 'conserving character' is not only concerned with 'preserving or maintaining character'; it is equally about accommodating and managing change to retain the landscape characteristics and benefits that society and local communities value. 'Enhancement' is about taking opportunities to improve an area's character by strengthening existing characteristics or introducing appropriate new features. For example, planting climate resilient species may be needed to replace existing historic trees. Both conservation and enhancement apply in National Parks, Areas of Outstanding Natural Beauty, and Heritage Coasts where they align with their statutory purposes and will also be appropriate in many wider landscapes.

In many cases, a mix of approaches will be appropriate throughout an area. It is also important that the feasibility of each approach is considered in relation to the practical functions required of the landscape. Steps taken should include discussions with stakeholders on what they currently value about the landscape, how it has evolved over time and what needs to change in the future. For example, options considered may lead to the creation of a new, high quality landscape in part of an area that has become degraded. In contrast, where an area's sense of place has been weakened by the loss of characteristic features, then the objective may be restoration reflecting a valued previous character. Overall, it is important to recognise that character is not just about visual aesthetics but, also about how a place feels and works to those who interact with it.

At a strategic level GI should:

- Take account of landscape/townscape character assessments, historic landscape character assessments and the National Character Area profiles.

- Aim to strengthen overall existing character, historic and landscape assets
- Help achieve targeted enhancements in character in areas of poor quality

At a local level GI should:

- Use character as a means to perceptually connect the built environment, natural green and blue spaces together
- Ensure new individual GI assets such as parks have an identifiable character
- Provide information at a local level which promotes local character.

Planning policies and decisions should ensure that developments are sympathetic to local character and history, including the surrounding built environment and landscape.

Supporting evidence

Natural England (2014) *National Character Area profiles: data for local decision making.* Available at: National Character Area profiles - GOV.UK (www.gov.uk)

Natural England and Department for Environment, Food & Rural Affairs (2014) *Landscape and seascape character assessments.* Available at: Landscape and seascape character assessments - GOV.UK (www.gov.uk)

Landscape Institute (2017) *Townscape character assessment.* Available at: Townscape character assessment | Landscape Institute

Statutory National Park and Area of Outstanding Natural Beauty (AONB) management plans – access via the relevant National Park or AONB website.

Government policy and guidance

Ministry of Housing, Communities and Local Government (2021) *National Planning Policy Framework.* Chapters 12, 15 and 16. Available at: National Planning Policy Framework (publishing.service.gov.uk)

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Principle How 1 - Partnership and vision Partnership working, collaboration and stakeholder engagement; create a vision for GI

Work in partnership, and collaborate with stakeholders from the outset to co-plan, develop and deliver a vision for GI in the area. Engage a diverse and inclusive range of people and organisations including citizens, local authorities, developers, landowners, communities, green space managers, environmental, health, climate, transport, and business representatives.

Description - what the principle is about

The multifunctional nature of GI means that to be successfully planned, delivered, used and maintained, many partners, stakeholders, and recipients of the benefits of GI should be involved. There is strong evidence that engaging end users in planning GI from the outset can substantially improve project outcomes. When planned and delivered well GI can provide benefits to everyone for the long term and play a vital role in placemaking. Collaboration and co-design can build trust and bring integrated outcomes across social, environmental, and economic agendas. The use of multi-disciplinary teams in both planning and delivery can help to maximise benefits.

The following key sectors and interests should be considered for inclusion in GI planning:

- Public bodies and local authority departments - Highways, transport, drainage, water, public health and wellbeing, education, ecology, heritage, landscape, parks/public space, climate change, finance, and planning
- Statutory consultees, statutory undertakers, utilities, and trusts
- Businesses, commercial interests and representative organisations for industry and commerce
- Community representatives, user groups, non-statutory education sector
- Land and property owners
- In addition to the consultees listed above, stakeholders with a specific interest relative to the project or area

Once the various organisations and individuals for inclusion have been identified it is important to ensure that they are bought into the process. One way of doing this is to identify the benefits for each audience and use this as the basis to gain their buy in. Adopting a partnership approach to GI policy and delivery should enable a wider range

of benefits to be gained and potentially secure funding from a wider range of sources. Partnership working should also be more inclusive and be able to respond to the needs of less well represented groups. Adequate funding and support from the outset are likely to be required to achieve inclusivity. Raising the profile and importance of GI based solutions in this way should also create long term benefits in terms of knowledge sharing and innovation.

To achieve strong partnerships at a strategic level, GI should:

- Use a partnership approach to establish a long-term vision for how green infrastructure will address core challenges
- Have an inclusive engagement and consultation strategy based on thorough stakeholder mapping
- Aim to strengthen communication networks to build knowledge sharing and joint outcomes
- Promote a GI approach to strategic outcomes in the policies of contributing organisations
- Provide information which promotes sustained involvement of stakeholders

To achieve strong partnerships at a local level, GI should:

- Place residents and stakeholders at the centre of the planning and design process empowering them to shape their local environment
- Take extra steps to be inclusive to make sure no one who wants to, or should be involved, is left out
- Ensure that when trade-offs have to be made these are understood, transparent and supported
- Manage any risks or uncertainties thoroughly
- Promote ongoing investment in relationships to sustain trust and ensure long term positive outcomes
- Ensure participants are clear as to what can and cannot be achieved

Setting out a partnership approach from the outset may mean that timescales for policy development and project delivery can be elongated as different interests are aired and understood. However, collaboration should ultimately bring more understanding, longer term involvement and result in better well thought through GI outcomes.

Supporting evidence

Scott, A.J. and Hislop, M. (2020) *What does good green infrastructure policy look like?* Town and Country Planning Association. Available at: *TCPA_PERFECT_ExpertP3-2.qxd (interregeurope.eu)*

Government policy and guidance

HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment.* Chapter 3. Available at: *25-year-environment-plan.pdf (publishing.service.gov.uk)*

Principle How 2 – Evidence. Use evidence, sound science and good land use practices to underpin plans projects, programmes, and policies

Use scientific evidence, and good land use practices when planning and enhancing green and blue infrastructure. Understand the evidence for the benefits of current GI assets; and data on environmental, social, and economic challenges and needs in the area.

Description - what the principle is about

Green infrastructure planning can be complex and long term. There can be competing priorities, vocal and hidden stakeholders, and resource constraints. GI based evidence can be used to help create specific plans such as GI strategies but also to inform policies in Local Plans,

Neighbourhood Plans and strategies from outside planning such as health and wellbeing plans. This means that using the most applicable evidence to the plan or policy and drawing on the experience of others can be of great help in making the right decisions. Evidence can come in many forms but in relation to GI can generally be split between:

- **Quantitative** (e.g., population facts and figures, data on wildlife and habitats, geology, maps of existing extent and location of GI, social statistics and trends, environmental targets, economic monitoring data, information on the economic and health value of GI)

- **Qualitative** (e.g., people's survey responses, description of landscape character, condition surveys, drivers, or policy needs)

To reflect the multi-functional nature of GI and to meet different people's and biodiversity needs, it is important to combine evidence from a range of sources. The breadth of evidence required to achieve good GI often means that organisations work in partnership providing strategic evidence from their specialism, followed by community and stakeholder engagement, and supplemented with specific local evidence and knowledge.

Ideally a strategic approach to evidence for comprehensively planned GI should be based around the five benefits:

1. Thriving nature and biodiversity gains

2. Health and wellbeing

3. Adding value and supporting prosperous communities

4. Improved water management

5. Making places more resilient to climate change and helping to meet zero carbon targets

Evidence on all these aspects is needed to plan GI well, not just in terms of current provision of these benefits and services but also future needs.

One key set of evidence is spatial mapping. Natural England has produced the first nationally consistent set of GI data and maps for organisations to use. This can be an invaluable starting point for identifying and strengthening strategic networks of GI and where to target GI interventions to meet local needs. For detailed GI planning this can be supplemented with richer local data such as information on street trees. Many voluntary organisations and records centres can provide useful local/regional data on species, sites, and habitats for instance.

This can work together with what has been the usual starting point for GI planning, collecting and collating evidence of GI assets such as parks and green spaces. This tends to pull together information on the following:

- Quantity
- Quality
- Accessibility (proximity)
- Naturalness
- Functionality/ Multiple benefits
- Distribution, Connectivity / networks of GI
- Landscape, Beauty, Sense of Place

Opportunity mapping for biodiversity is also increasingly coming to the fore to provide the evidence for Biodiversity Net Gain along with data on health inequalities to target issues related to physical and mental wellbeing.

At a strategic level:

- Evidence should be used to establish a baseline for quantity and provision of GI in an area
- The current functions and benefits those assets are delivering should be identified
- The priorities and needs of communities should be mapped
- Evidence is developed to support conservation of assets currently providing important services

- Enhancement of those assets that could deliver better services is evidenced
- Creation of new assets in areas of identified deficiency is supported by evidence

At a local level:

- Where local evidence is insufficient to bring clarity, further data should be collected including community GI needs assessments
- Evidence should be provided in a format which can easily be understood by local communities

GI has a really important role in addressing needs, to ensure there is buy in at all levels evidence should be provided which can be built on over time and makes sense to both decision makers and the public.

Supporting evidence

Natural England (2020) *The People and Nature Survey.* Available at: The People and Nature Survey - GOV.UK (www.gov.uk)

Office for National Statistics (2018) *UK natural capital: ecosystem accounts for urban areas.* Available at: *UK natural capital - Office for National Statistics (ons.gov.uk)*

Rolls, S. and Sunderland, T. (2014) *Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2).* Natural England Research Reports, Number 057. Available at: Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2) - NERR057 (naturalengland.org.uk)

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Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) *Planning Practice Guidance for the Natural Environment.* GI section. Available at: Natural environment - GOV.UK (www.gov.uk)

HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment.* Available at: 25-year-environment-plan.pdf (publishing.service.gov.uk)

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Principle How 3 - Plan GI strategically to secure GI as a key asset in policies to create and maintain sustainable places

Plan strategically and secure GI as a key asset in local strategy and policy, at all scales. Fully integrate and mainstream GI into environmental, social, health and economic policy. Create and maintain sustainable places for current and future populations and address inequalities in GI provision.

Description - what the principle is about

Green infrastructure should be treated equally alongside other types of infrastructure. This means it needs to be included as key infrastructure in local strategy and policy documents. This can enable GI to deliver a range of social, health and economic policy objectives, as well as environmental objectives, as part of place-making and place-keeping. In order to integrate GI into policies it can be useful to develop a simple map of relationships or "policy wheel" for making, maintaining, or strengthening links between GI and wider policy and strategy. The "policy wheel" can help to develop specific elements of a "supportive policy list". This can set out what role GI can play, map out stakeholder interests and links and help to communicate the relevance of GI to the range of policy makers. This in turn can provide the basis for establishing how GI strategies, local plans, Local Nature Recovery Strategies (LNRS), Biodiversity Net Gain (BNG), Tree and Woodland strategies etc all work together. This will help coordinate and focus a range of activity to use and manage land better for the environment. This includes targeting BNG towards the locations where creating or improving habitat will achieve most, and helping planners and developers avoid damage to areas of greatest environmental importance. Habitat created or improved through LNRSs will contribute to GI.

The use of evidence on what can be delivered through GI to jointly address needs is crucial. An example of a Policy Wheel is shown below

Natural England's Green Infrastructure Strategy Standard encourages local authorities to work on an area wide basis to strategically plan GI. This can be achieved through mechanisms such as producing a Green Infrastructure Strategy. In doing this, local authorities can apply the 15 Green Infrastructure Principles and the Green Infrastructure Standards locally (adapting them to local context where appropriate) and set green infrastructure policies, proposals and development requirements in development plans and local design codes. The five Headline Green Infrastructure Standards are:

- Green Infrastructure Strategy Standard
- Accessible Greenspace Standard
- Urban Nature Recovery Standard
- Urban Greening Factor Standard
- Urban Tree Canopy Cover Standard

Local authorities are encouraged to set SMART targets in a Delivery Plan for achieving the national standards and local policies over time, as well as arrangements for the long term management and maintenance of all green infrastructure. It is recommended that local targets are monitored, and progress evaluated against delivery every five years.

The extent to which GI needs to be integrated with other strategies will depend on local needs and opportunities. The key document is likely to be the statutory Development Plan for the area as this provides the opportunity for GI to be introduced as a separate policy and integrated into other policies and as a Supplementary Planning Document (SPD). This means that both strategic GI policies and GI linked to proposed development can be included in a local plan.

GI could also be considered in other plans and strategies such as:

- LNRSs to set priorities and map opportunities for nature recovery and environmental improvement.
- Climate change adaptation and mitigation strategies especially those which are aimed at addressing flood risk/water management and higher temperatures.
- Health policies designed to address local inequalities in health outcomes.
- Economic regeneration policy especially where poor quality environments are restricting investment.
- Infrastructure delivery plans and strategies such as transport and travel strategies

Specific aspects of GI such as trees and woodlands may also be dealt with as separate policy and considered. Introducing a separate GI strategy to inform or supplement other policies and plans can help to deliver better GI in both urban and rural areas. They can set out further detail on local needs, gaps in provision and opportunities for enhancement. Planning strategically should link back to the evidence and enable the development of the business case to ensure funding for new and improved GI.

Supporting evidence

Landscape Institute (2013) *Green Infrastructure: An integrated approach to land use.* Available at: Green Infrastructure: An integrated approach to land use

Government policy and guidance

Ministry of Housing, Communities and Local Government (2021) *National Planning Policy Framework.* Chapters 3 and 15. Available at: National Planning Policy Framework (publishing.service.gov.uk)

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) *Planning Practice Guidance for the Natural Environment.* GI section. Available at: Natural environment - GOV.UK (www.gov.uk)

Principle How 4 - Design GI to create beautiful, well-designed places

Understand an area's landscape/townscape, natural, historic, and cultural character, to create well-designed, beautiful, and distinctive places.

Description - what the principle is about

Good placemaking go hand in hand with well thought through design and GI should be regarded as key to achieving this.GI therefore needs to be planned and designed at the same time and scale as other built infrastructure such as transport and communications. Usually this means GI being evaluated and integrated into developments at the outset and not considered later on, or at the end of the design process. An early focus on design can ensure that GI is well integrated and fit for purpose on completion of the development. To make this work, developers and landowners need to be aware that GI is a key infrastructure and that it delivers a range of environmental, social, health and economic benefits. Good design is crucial for the long-term success of GI.

The Green Infrastructure Planning and Design Guide published as part of the Framework describes and illustrates:

- how to design Green Infrastructure features as 'building blocks' of a larger connected network;
- how to combine Green Infrastructure features in different 'area types' to create multifunctional and connected networks that meet the Green Infrastructure Standards;
- how to design Green Infrastructure to meet identified needs (i.e., delivering ecosystem services) with a particular focus on nature, health, climate change, water management and prosperity;
- how to develop landscape-led Green Infrastructure with a focus on landscape character and local distinctiveness.

Collection of baseline information can help with understanding the relative importance of the different elements. The baseline should consider:

- The setting of the area, including how it sits within the landscape, views in and out, and any existing 'green corridors', topography, geology, soils, ecology, river and waterways and open space
- The character of the area itself - how its natural, cultural/historic, and perceptual characteristics combine to make the place distinctive.
- Community needs and values, so that the design reflects these and what the community considers to be beautiful, inspiring and/or symbolic in that area

- Data on environmental, social, and economic challenges and needs in the area that green infrastructure could help to address.
- International value such as UNESCO World Heritage and UNESCO Global Geoparks
- National value if it is a National Park, AONB, Heritage Coast or Site of special scientific interest (SSSI) and National Nature Reserve (NNR)
- Local value such as Local Wildlife Sites, Local Geological Sites and Local Nature Reserves, Local Green Space

This information may come from existing national, county/district and local landscape character assessments; townscape and historic character studies; and from statutory National Park and Area of Outstanding Natural Beauty (AONB) management plans and a range of other strategic plans, as well as from the GI Mapping Database. Existing landscape strategies, policies and guidelines and local design codes for an area should also be used. If an assessment does not exist at the right scale for the GI scheme, then a new study may be required.

The findings can then inform the overall approach to the GI (conserve, enhance, restore, or create) and its detailed design. This can include opportunities to:

- Promote nature recovery through enhancement, retention, expansion and buffering of existing landscape features such as trees, hedges, meadows, woodlands, natural and man-made outcrops, and water features. This includes the planting of trees along new streets and keeping existing trees wherever possible.
- Support connection and interaction with nature
- Create features for carbon storage and sequestration
- Improve water flood management, supply, and quality
- Protect and enhance soils and geodiversity
- Address air quality, noise, and temperature regulation issues
- Integrate pollinator habitats into the built environment
- Create new green spaces and features that fit well into their surroundings and will serve current and future needs.
- Make new physical and visual links between areas, especially on settlement edges.
- Introduce food production into local areas-community orchards, allotments, urban food

- Improve community safety and reduce crime
- Link to formal and informal education and learning.
- Increase recreation, sport, and active travel opportunities
- Enhance aesthetic value/ sense of place, historic and cultural environment, and retain and open up key views.
- Restore historic landscape features and areas such as park and enhance the setting of a settlement or historic landscape assets.

The grain or pattern of new developments can be greatly influenced by the interrelationship between the spaces between buildings. GI has a vital role in helping to create networks and linkages through developments which can physically and psychologically connect spaces, different uses, and buildings to create a sense of place. Good landscape design principles should be practically applied suggesting a balance of hard and soft spaces based on the intensity of uses. Good GI can foster community cohesion through providing spaces for informal interaction and blurring the lines between uses and public and private land. This can help to develop creativity and pride in a place. GI designed with passive surveillance, active uses and frontages can play a significant role in reducing crime and/or the fear of crime and anti-social behaviour. At a local level, designations such as Conservation Areas, Tree Preservation Orders, Common Land, Ancient Semi-Natural Woodland will reflect historic and cultural values and services and can inform decision making.

There should also be a strong relationship between GI design and sustainability. This can be through ensuring good practice in construction and that materials used minimise impacts and maximise benefits, particularly in terms of climate change. Substitution of carbon heavy materials such as concrete for lower impact, locally produced, products, can make a long-term difference and should form part of the design thinking. This should be considered at the master planning stage, as well as at the detailed design, to ensure that early decisions do not preclude opportunities for more sustainable approaches.

Supporting evidence

Landscape Institute (2013) *Green Infrastructure: An integrated approach to land use.* Available at: Green Infrastructure: An integrated approach to land use Natural England (2014) *National Character Area profiles: data for local decision making.* Available at: National Character Area profiles - GOV.UK (www.gov.uk)

Landscape Institute (2017) *Townscape character assessment.* Available at: Townscape character assessment | Landscape Institute

Natural England and Department for Environment, Food & Rural Affairs (2014) *Landscape and seascape character assessments.* Available at: Landscape and seascape character assessments - GOV.UK (www.gov.uk)

Historic England (no date) *Historic Landscape Characterisation.* Available at: Historic Landscape Characterisation: a Tool for Understanding and Managing Whole Areas | Historic England

Statutory National Park and AONB management plans – access via the relevant National Park or AONB website.

Government policy and guidance

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) *Planning Practice Guidance for the Natural Environment.* Landscape section. Available at: Natural environment - GOV.UK (www.gov.uk)

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Principle How 5 - Managed, valued, monitored and evaluated. Establish good governance, funding, management, monitoring, and evaluation of GI

Plan good governance, funding, management, monitoring, and evaluation of green infrastructure as a key asset from the outset and secure it for the long-term. Make the business case for GI. Engage communities in stewardship where appropriate. Celebrate success and raise awareness of GI benefits.

Description - what the principle is about

Good quality GI needs strong governance and a long-term strategic approach to management, funding, monitoring and evaluation. This means considering stewardship of GI from the outset and designing GI for long-term sustainability on site and through supporting policy.

Governance

Good governance in the context of GI stems from the involvement of the right people and organisations, clear responsibilities, the ability to plan ahead and to respond to changing circumstances, the resources to deliver and efficient processes. This means that governance structures and people in the key roles, need to be appropriate to the scale and type of GI. For example, collaboration between communities, landowners, wildlife organisations, Business Improvement Districts (BIDs), Local Enterprise Partnerships (LEPs), the lead local flood authority, health and wellbeing boards and local authorities, are likely to bring the necessary breadth of experience to the table at a strategic level and aid long-term thinking.

Governance may also be related to the type of land tenure and ownership and the legal arrangements associated with it including trusts that hold land, tenancies, conservation covenants and common land. This and the multifunctional nature of GI can make governance complex. Confirming who has certain responsibilities and if these are shared can be beneficial. For instance, who is involved in preparing and implementing the funding strategies and making sure they take account of both capital and revenue requirements.

At a site level, governance bodies should include relevant stakeholders and representatives of local communities and users. This will ensure that the GI is responsive to local needs. This can also aid with future proofing and responding to changes such as transfers of land ownership and new demand created by developments. In some cases, permanent independent ownership of GI assets can help to reinforce the long-term strategic role they play and increase their protection.

Additional protection measures are not always necessary but can be considered where green spaces are sparce, or there is a likelihood of land being lost. There are various mechanisms by which land can be protected as GI, through designation or ownership. Local Green Space designations, Local Wildlife Sites, Local Nature Reserves are all potential ways to offer some protection. Dedication under section 16 of the CROW act 2000 can provide open access land. Creation of land owning trusts and conservation covenants, offer long term ways of protecting space with recreational and/or wildlife value and avenues for maintenance funding.

Management

The long-term and on-going management and maintenance of GI is critical to achieving multifunctionality. GI benefits can be delivered within a site but can also extend into the surrounding area and across administrative boundaries. This means that the management of one site can affect the ability of another to deliver its GI benefits, and responsibilities may be split. The consequence is, there can be a need to take a strategic view of GI management across and between areas. This is particularly pertinent for issues such flood risk and biodiversity networks.

At a site level management and maintenance considerations must be included early in the design process. Developers and landowners in particular need to be aware of the need to positively manage GI to provide benefits into the future. In developments implemented in phases, this should be a consideration at the very start, so the GI is consistently managed long term.

Involving local communities and local stakeholders in discussions on long term management can be very valuable. They often have insights into local needs and issues. The development of skills can form part of residents, contractors, owners, and users all having greater knowledge and ability to maintain the spaces. This wider involved in management delivery can be very successful but must be matched by appropriate resources both in terms of funding but also staff support.

Valued

A natural capital approach to policy and decision making considers the value of the natural environment for people and the economy. Creating an inventory of GI assets, including as part of a broader natural capital account, can be useful in recognising, communicating and analysing the quantity and value of GI. This can enable a baseline to be established and the contribution of GI valued over time. It will also mean that the value of GI can be communicated in non-monetary terms.

Funding

GI has the advantage of being cross cutting. Looking at funding from a multi-disciplinary perspective creates the potential to tap into a range of sources. For example, from transport, climate change resilience, health, air quality, water quality, flood prevention, community cohesion, sport, art, and economic regeneration. This

means collecting a range of evidence on the benefits and economic returns on investment will be needed to make the business case for investing in GI. The cross-sector approach also provides opportunities for innovative income generation. Crowd funding, contactless donation technology, habitat and carbon banking are all relatively new and flexible. Blended finance models including public income and private or voluntary sector contributions are also possible. 'Stacking' and 'bundling' are mechanisms for packaging and selling environmental services from nature. The terms describe whether and how different environmental services can be sold separately from the same piece of land, or sold as a single product reflecting more than one service. These types of mechanisms are likely to increase in the coming years and link to Biodiversity Net Gain (BNG).

On a site basis asset transfer or long leases to social enterprises, charitable trusts, or partnerships with community or other organisations, up-front endowments, service charges from commercial and residential sectors and licences can help reduce costs and increase income. New funding streams such as the Environmental Land Management Schemes will be important in the future.

For local authorities planning conditions, obligations, or the Community Infrastructure Levy (CIL) are the key mechanisms for securing funding for GI implementation and ongoing management from development. Developer contribution policies may need to be updated to take account of BNG and provide evidence-based funding to support proper long-term management and maintenance of GI.

Monitoring and evaluation

The multifunctional nature of GI and breadth of interested parties is likely to mean that evidence from a range of sources will be required to effectively monitor and evaluate GI delivery. Long-term monitoring and evaluation of policy and GI provision is likely to need both quantitative (e.g., facts and figures, data, measurements, statistics, targets, monitoring data, information on the economic value of GI) and qualitative (e.g., people's survey responses, description of landscape character, drivers, or policy needs) data.

Natural England's Green Infrastructure Strategy Standard recommends that monitoring and evaluation of progress against policies and targets takes place every five years. For major development the Standard recommends that a Green Infrastructure Plan (which may be part of a Design and Access Statement) should be in place. This should set out how the development will deliver the local green infrastructure policies, proposals and development requirements in development plans and local design codes. It also states that the green infrastructure delivered within (or associated with) major new developments should be managed, maintained, and monitored for a minimum of 30 years.

Natural England's GI mapping products will provide a consistent national baseline which can be supplemented with local data. To be effective, monitoring and

evaluation should include information on the current functions and benefits that GI assets are providing (the ecosystem service supply) and the priorities and needs of communities (ecosystem service demand).

Benchmarks and standards can be used to further assess needs and monitor supply of GI functions. The Accessible Greenspace Standard (AGS) and Urban Greening Factor (UGF) are tools which can help with identifying areas of need and GI deficiency. Monitoring and evaluation using the AGS and UGF can help with developing plans that conserve and enhance sites currently providing GI services and create new assets in areas of identified deficiency. Evaluation of provision should also take account the future vulnerabilities of the assets where possible.

In certain localities a Community Green Infrastructure Needs Assessment may be appropriate. It can help to inform local policy, strategy, design and investment in GI, and the data and analysis used to develop effective monitoring and evaluation.

Supporting evidence

Natural England (2016) *Putting economic values on green infrastructure improvements. Access to Evidence Information Note EIN022.* Available at: Putting economic values on green infrastructure improvements

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Hurst, M. (2019) *Demystifying Cost Benefit Analysis: Valuing Nature Paper.* Available at: Demystifying Cost Benefit Analysis

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