Process Journey for Developers and Design Teams

Incorporating Green Infrastructure into Development using the Green Infrastructure Framework- Principles and Standards for England

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Contents

1.0 Introduction

1.1 This Process Journey has been designed for developers and design teams intending to use the Green Infrastructure Framework to develop and incorporate green and blue infrastructure into new developments. The aim is to enable informed and comprehensive green infrastructure within new developments that addresses local needs and responds to local opportunities. (In this document the term green infrastructure includes both green and blue infrastructure).

1.2 The Process Journey provides:

1. An overview diagram showing recommended steps to take
2. A table showing more detail on the steps to take and relationships to the GI Framework's Principles
3. Suggested actions to take at each of the eight suggested stages of the process

1.3 Each step of the process includes related links to online resources including:

1. Government policy and guidance
2. Evidence which supports the theory behind the step
3. Relevant tools

1.4 This Process Journey is one part of the Green Infrastructure Standards Framework, and it should be used in conjunction with:

- The 15 Principles of Green Infrastructure
- The on-line Green Infrastructure Mapping Database and User Guide
- The Green Infrastructure Headline standards
- The Green Infrastructure Planning and Design Guide

1.5 Please note the term green infrastructure covers blue infrastructure as well for the purposes of this process journey. Documents mentioned in the text are referenced at the end of each section.

Future modifications

1.6 The introduction of Biodiversity Net Gain (BNG) and Local Nature Recovery Strategies (LNRSs) will affect local policy, plan-making, the design and implementation of green infrastructure. Guidance on how Local Planning Authorities need to have regard to LNRSs will be made available by government in due course along with the implementation of BNG. In addition, the Government has committed to comprehensive reform of the planning system. The Process Journey will be updated to reflect changes in guidance and policy to avoid duplication and maximise benefits.

Figure 1 - Overview diagram showing the order of the recommended stages to incorporate **green infrastructure** into new developments
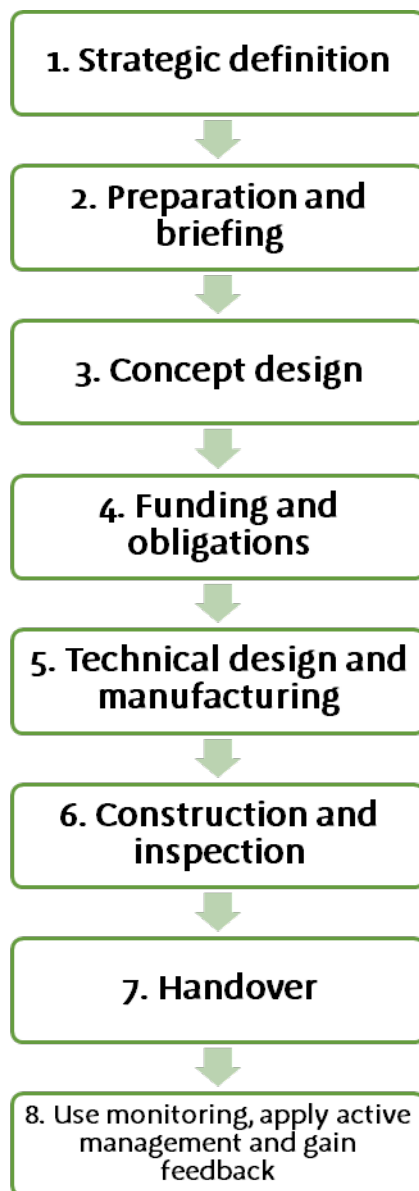
1.7   In terms of staff resource this process journey assumes that developers and design teams will seek to minimise additional work, by incorporating green infrastructure thinking into existing processes. This process journey has a strong correlation with the RIBA Plan of Work 2020.

Table 1 – Table showing the 8 stages to incorporate green infrastructure into new developments, the steps to take and related Green Infrastructure Principles

Stage	Steps to take	Related GI Principles
1. Strategic definition	Review: • The Natural England Green Infrastructure Principles, Green Infrastructure Design Guide, Green Infrastructure Standards • The local plan including any green infrastructure strategy and local design codes • Lessons from good green infrastructure practice Create a strategic concept for green infrastructure within the site and connectivity with GI networks outside the site.	How 3 - Plan strategically
2. Preparation and briefing	Understand the existing green infrastructure network in an around the proposed development site by: • Reviewing green infrastructure opportunities and issues from the site appraisal • Analysing mapped resources including Natural England green infrastructure maps and data • Assessing quality, quantity and distribution of current green infrastructure assets and the benefits they bring • Identifying gaps in provision, inequalities in access and opportunities for new or enhanced green infrastructure provision • Engagement with the local community and stakeholders • Lessons learnt from green infrastructure in previous developments • Identify priorities which green infrastructure could help address, which could be related to:	How 2 - Evidence How 3 - Plan strategically

Stage	Steps to take	Related GI Principles
	• Thriving nature and biodiversity gains • Health and wellbeing benefits • Prosperity and regeneration • Improving water management • Making places more resilient to climate change and helping to meet zero carbon targets Establish specific outcomes for green infrastructure and outline these in the project brief.	
3. Concept design	Identify and develop concept designs for green infrastructure interventions which: • Reflect the Green Infrastructure Principles, Green Infrastructure Standards, Green Infrastructure Planning and Design Guide, local plan policies and local design codes • Incorporate Biodiversity Net Gain requirements into green infrastructure • Respond to related standards • Meet people's needs • Address inequalities in green infrastructure provision • Help meet wider economic and social and objectives • Enhance local character and sense of place • Function and connect as a living network	How 4 - Design
4. Funding Obligations	Understand how planning conditions, obligations or the Community Infrastructure Levy may be used by local planning authorities to secure and fund green infrastructure.	How 1 - Partnerships and vision
5. Technical design and manufacturing	Detailed green infrastructure proposals as part of planning applications should:	How 4 - Design

Stage	Steps to take	Related GI Principles
	• Meet local plan policies and local design codes • Be based on the evidence collected in previous stages • Make use of landscape and other relevant specialists • Integrate stakeholder views, including local communities • Ensure green infrastructure will be governed, managed, monitored, maintained and funded for the long term Specify in the design: • Techniques and approaches to maintain and where possible enhance existing green infrastructure, and minimise adverse impacts • Materials, planting, and methods which maximise the planned multiple benefits of green infrastructure and respond to local character and local design codes	
6. Construction and inspection	Ensure: • Impacts on existing green infrastructure are avoided, and if impacts are unavoidable, minimised and compensated • Inspections of landscaping, SuDS and green infrastructure planting involve an appropriate level of expertise	How 5 - Manged Valued Monitored and Evaluated
7. Handover	• Involve communities and other stakeholder groups in discussions on long-term management and maintenance. • Hand over a maintenance and management plan to the appropriate stakeholder.	How 5 - Manged Valued Monitored and Evaluated

Stage	Steps to take	Related GI Principles
8. Actively monitor	Monitor: • The performance of the green infrastructure against needs • User feedback • Levels and costs of maintenance and management	How 5 - Manged Valued Monitored and Evaluated

1.8   Incorporating green infrastructure into new developments will deliver a network of multi-functional greenspace for people, places and nature. We recommend that developers and design teams follow the process outlined below.

2.0 Eight Stage Process Journey

2.1. Stage 1 - Strategic Definition

Overview

2.1.1   Review:
- The Natural England Green Infrastructure Principles, Green Infrastructure Planning and Design Guide, Green Infrastructure Standards
- The local plan including any green infrastructure strategy and local design codes
- Lessons from good green infrastructure practice

Create a strategic concept for green infrastructure within the site and connectivity with green infrastructure networks outside the site.

Detailed description

2.1.2   The multifunctional nature of green infrastructure, the way it links locations and sites together and can be introduced at all scales, means that it should be planned strategically and at the start of the planning process. Planning Practice Guidance states that: "Green infrastructure opportunities and requirements need to be considered at the earliest stages of development proposals, as an integral part of development and infrastructure provision, and taking into account existing natural assets and the most suitable locations and types of new provision. To ensure that green infrastructure is fully integrated into new development, all the relevant strategic polices, objectives and standards which relate to green infrastructure should be fully considered at the outset.

2.1.3   Reviewing the Natural England Green Infrastructure Framework, will provide strategic context. The Green Infrastructure Principles can help determine the breadth of potential green infrastructure requirements for a development. The Green Infrastructure Planning and Design Guide can be used alongside the National Model Design Code to provide useful national context to local design guides.

2.1.4   Natural England's Green Infrastructure Strategy Standard identifies that major development should include a Green Infrastructure Plan setting out how the development will deliver the Green Infrastructure Framework's 15 Green Infrastructure Principles and the 5 Headline Green Infrastructure Standards, as set out in local green infrastructure policies, proposals and development requirements in development plans and local design codes. This should come with a commitment to manage, monitor and maintain the green infrastructure for minimum of 30 years.

2.1.5   To be acceptable a development will need to comply with both National Planning Policy, Local Plan and Supplementary Planning Documents. Local authorities should strategically plan their green infrastructure provision and set green infrastructure policies, proposals and development requirements in development plans and local design codes. These will set the context for development and should in most cases be based on the National Green Infrastructure standards.

2.1.6   Other local strategies and assessments may also apply depending on the type and location of development for instance Joint Plans and Spatial Development Strategies. The planning history of the site and surrounding area will be relevant especially if similar proposals have or will be submitted.

2.1.7   The Environment Act (2021) includes provisions that makes BNG mandatory in England for most development types. The Biodiversity Metric used to calculate biodiversity net gain, incorporates many common green infrastructure habitat features, such as Sustainable drainage systems (SUDs), green roofs and walls etc and their inclusion in a scheme design can contribute towards meeting Biodiversity Net Gain (BNG) requirements. In many cases it will be possible for onsite green infrastructure or local offsite green infrastructure provision, to positively contribute to meeting BNG requirements. It will be important to consider how access is managed, particularly where BNG habitats may be sensitive to disturbance.

2.1.8   Thorough research should help to determine the type and form of green infrastructure and how it can be integrated into the development. This will include consideration of how green infrastructure functions and connects as a living network within and beyond the red line boundary to enhance networks for people and nature for example, connecting provision of green infrastructure with those

who need its benefits. Site appraisal work typically involves both desktop studies and site visits, both should be used to help determine the required green infrastructure along with appraisal of nearby green infrastructure. This is because how the site fits into the wider green infrastructure context is important and will require an understanding of the existing green infrastructure network works both within and around the site. Evidence used to prepare the Local Plan can be useful. This may include Local Nature Recovery Strategies (LNRSs), strategic flood risk assessments (SFRAs), open space assessments, landscape/townscape and historic character assessments and walking and cycling strategies. The SFRA, for example, might identify needs and opportunities for Sustainable Drainage Systems (SuDS) or river restoration. To be effective green infrastructure is seldom isolated, a clear narrative on how the green infrastructure within a site links to other green infrastructure in the wider area is important. Strengthening or development of linkages to designated landscapes such as AONBs should be factored into network considerations.

Government policy and guidance, Evidence and Process tools for Stage 1 Strategic definition

2.1.9   **Government Policy and guidance:**
- Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance for the Natural Environment

2.1.10   **Evidence**:
- Strategic Flood risk assessments, cycling and walking strategies and open space assessments, should be available from the relevant local authority.
- Department for Environment, Food & Rural Affairs (2015) River Basin Management Plans

2.1.11   **Process tools:**
- Royal Institute of British Architects (2020) Plan of work
- HM Government (2021) Transport Analysis Guidance www.gov.uk/guidance/transport-analysis-guidance-tag

2.2. Stage 2 - Preparation and Briefing

Overview

2.2.1   Understand the existing green infrastructure network in an around the proposed development site by:
- Reviewing green infrastructure opportunities and issues from the site appraisal
- Analysing mapped resources including Natural England Green Infrastructure Maps and data
- Assessing quality, quantity and distribution of current green infrastructure assets and the benefits they bring

- Identifying gaps in provision, inequalities in access and opportunities for new or enhanced green infrastructure provision
- Engagement with the local community and stakeholders
- Lessons learnt from green infrastructure in previous developments

2.2.2   Identify priorities which could help address the 5 'Why' Green Infrastructure Principles:
- Thriving nature and biodiversity gains
- Health and wellbeing benefits
- Prosperity and regeneration
- Improving water management
- Making places more resilient to climate change and helping to meet zero carbon targets

2.2.3   Establish specific outcomes for green infrastructure and outline these in the project brief.

Detailed description

2.2.4   Well planned green infrastructure should be integrated with social, health, transport and environment outcomes as part of good place-making and place-keeping. In order to do this, a thorough review of the wider site context and local priorities should be prepared. An ecosystem services approach is one way to ensure all aspects are considered. The ecosystems services provided by green infrastructure include:

Provisioning Services

Products such as food, water, fibre, and fuel

- Food production, for example, allotments
- Fish production
- Wild plants and animals
- Water supply
- Materials, including minerals and timber
- Energy production

Regulating services

Services such as water purification, climate regulation, noise and air pollution reduction and flood hazard reduction

- Carbon Sequestration
- Air quality regulation
- Noise regulation
- Local climate regulation for example urban cooling
- Water quality regulation
- Erosion protection

- Flood regulation
- Pollination
- Pest control

Cultural services

Non-material services, for example recreational enjoyment and aesthetic experience

- Recreation
- Aesthetic value
- Physical and mental health and wellbeing
- Scientific and educational interactions
- Heritage interactions
- Nature Interaction/connection
- Value placed on intrinsic value of nature
- Sense of Place

2.2.5 Advice on designing for different ecosystem services and functions like air quality, flood regulation, urban cooling, recreation and sense of place are included in the Green Infrastructure Planning and Design Guide and in assessment tools like the Environmental Benefits from Nature Tool.

2.2.6 In overall planning terms, the degree to which the development meets the following, should be evaluated:
- respect for the site context
- making best use of the land
- improving accessibility, connectivity and safety
- minimising the environmental impact
- responding to climate change

Identification of opportunities and issues

2.2.7 As part of the site appraisal, the opportunities for and constraints on green infrastructure should be fully considered. Lessons learnt from delivering green infrastructure within previous developments can be used to inform the green infrastructure proposals. The 15 Green Infrastructure Principles can be used for identification of opportunities and issues, but a few examples are given below.
- views of local landmarks and open countryside
- site features which can be opened up for use or enhanced and connected to wider networks of
- potential to improve cycle and walkways
- air quality impacts of a busy road near the site
- opportunities to enhance nature and heritage assets
- consideration of protected trees
- how to take account of utilities within or near to a site

Engagement

2.2.8   Partnership working, collaboration and stakeholder engagement are critical for planning and delivering green infrastructure that meets local needs. Engaging with the Local Planning Authority at the earliest opportunity to understand their requirements for green infrastructure on the site is crucial. Discussions can also usefully involve local communities and other local stakeholders. Discussions can include risks and opportunities, arrangements for funding, governance, management and maintenance of green infrastructure.

2.2.9   For larger developments and where consultation has not been carried out as part of the site allocation process for a Local Plan, engagement with the local authority, expert stakeholders and the local community is important. For the local authority this may include:
- Planning officers
- Transport / highways leads
- Regeneration leads
- Landscape design leads
- Climate change mitigation and adaptation leads
- Schools and education providers

2.2.10   Expert stakeholders may include:
- Directors of Public Health, environmental health practitioners and Health and Wellbeing Boards, Integrated Care Boards, Integrated Care Partnerships
- Local biodiversity or ecology experts (including Local Nature Partnerships, wildlife trusts and RSPB).
- Lead Local Flood Authorities and water companies.
- Local Enterprise Partnerships.
- Community safety officers and the police

2.2.11   The Local community may include:
- Local residents, community groups and community representatives
- Town and parish councils
- Neighbourhood planning groups
- Land and property owners and managers

2.2.12   This engagement can help you establish how green infrastructure can meet their objectives. The Planning Officer may be able to facilitate this engagement. Key topics might include how:
- Green infrastructure can achieve a measurable increase in biodiversity through the creation, enhancement and connectivity of new and existing habitats
- Green infrastructure can address health inequalities and support activities that are beneficial to health and wellbeing

- Green infrastructure can help create high quality environments which attract businesses and investors
- Green infrastructure can improve water quality
- The design can help to mitigate climate change and address the effects of climate change. For example, measures to reduce the risk of flooding, minimise the urban heat island effect and help wildlife to adapt

Priorities

2.2.13 It is also important to understand the quantity, quality and distribution of current green infrastructure assets and the multiple benefits they provide for people and nature. This also needs to be explained to stakeholders.

2.2.14 To identify sites and their accessibility the Natural England Green Infrastructure website maps the Accessible Greenspace Standards for England (previously the Accessible Natural Greenspace Standards). This shows the size, distribution, type and catchment of green infrastructure sites. This mapping and analysis can help you identify gaps in provision or inequalities in access. This is particularly important if the development is in an area with low car ownership or a high density of population. In these circumstances very local green infrastructure will be important. 3D modelling and virtual reality are now increasingly available for use in consultation and engagement. Green infrastructure is particularly suitable for these approaches and can illustrate the impact of aspects such as canopy cover over time.

2.2.15 Once the consideration of policies and the wider context is complete, site surveys can start to inform the approach to green infrastructure. This in turn can help with analysing how the green infrastructure is delivering benefits to meet needs and priorities. Landscape and ecology expertise is likely to be needed in most cases. For some smaller sites, it may be sufficient to identify what existing assets need to be maintained and opportunities for enhancement, such as green roofs or walls.

2.2.16 After taking the planning requirements and the evidence collected into account it should be possible to establish what green infrastructure outcomes the development can achieve in broad terms. These outcomes can be included in the project brief for the design team. These outcomes could include the green infrastructure delivering certain benefits. Or it could mean setting benchmarks for quantity or quality.

Government Policy and Guidance, Evidence and Process tools for Stage 2 Preparing and briefing

2.2.17 **Government Policy and guidance**
- Ministry of Housing, Communities and Local Government (2021) [National Planning Policy Framework](#)

2.2.18 **Evidence**
- Natural England (2020). [Mapping and Accessible Natural Greenspace Standards Analysis](#)
- Office for National Statistics (2019). [UK natural capital: Urban accounts](#)

2.2.19 **Process tools**
- Homes England (2019) [Garden Communities toolkit](#)
- Natural England (2021). [The Environmental Benefits from Nature Tool – Beta Test Version (JP038) 21)](#)

2.3. Stage 3 - Concept Design

Overview

2.3.1 Identify and develop concept designs for green infrastructure interventions which:
- Reflect the Green Infrastructure Principles, Green Infrastructure Standards, Green Infrastructure Planning and Design Guide, local plan policies and local design codes
- Incorporate Biodiversity Net Gain requirements into green infrastructure
- Respond to related standards
- Meet people's needs
- Address inequalities in green infrastructure provision
- Help meet wider economic and social and objectives
- Enhance local character and sense of place

Detailed description

2.3.2 The concept design stage should be informed by:
- The mitigation hierarchy, by assessing what green infrastructure exists on the site already, how best to avoid, minimise or mitigate impacts, best manage or enhance existing assets and as a last resort compensate for loss on site by providing green infrastructure elsewhere.
- The specific green infrastructure interventions to meet people's needs identified through the evidence gathered in step 2.
- The contribution the site can make to meeting wider objectives (for example net zero by 2050, air quality management targets, nature recovery assessments

and local priority habitats and species, overall flood risk reduction or increased physical activity) these should be identified in the local plan.

- Relationship to Building Research Establishment Environmental Assessment Method BREEAM and Environmental Impact Assessments (if needed to support the planning application).
- Biodiversity Net Gain requirements.

2.3.3 Natural England's Green Infrastructure Standards can help to drive the quantity and quality of green infrastructure in new development, for example by:
   a. Increasing areas where nature can thrive in line with the Urban Nature Recovery Standard (part of Natural England's Green Infrastructure Standards).
   b. Helping to identify inequalities in green infrastructure provision using the Accessible Greenspace Standards and analysis (previously ANGSt analysis - see Green Infrastructure Mapping Database) to ensure the right green infrastructure in the right place to meet people's needs.
   c. Setting an aspiration for the amount of green cover on site through using the Urban Greening Factor (part of Natural England's Green Infrastructure Standards).
   d. Increasing Tree Canopy Cover (see Natural England's Green Infrastructure Standards)

2.3.4 The Natural England Green Infrastructure Planning and Design Guide can help inform the design, and can be used alongside the National Design Guide, the National Model Design Code and requirements in local authority local design codes. The Design Guide describes the 'Building Blocks' of green infrastructure which include:
- Sustainable drainage systems
- Green and blue roofs
- Green walls
- Rain gardens
- Swales
- Features for species
- Trees in hard landscapes
- Street furniture and utility structures
- Traffic-free routes,
- Allotments,
- Orchards,
- Private domestic gardens,
- Green spaces (including parks and burial grounds),
- More natural spaces (including woodlands, grassland, scrub, and hedgerows),
- Heritage features and the historic environment,
- Blue spaces (including wetlands).

2.3.5   The design process should not just look at any green infrastructure feature in isolation. Green infrastructure should be well-designed and integrated from the concept or master planning stage. It should be possible to incorporate green infrastructure at any scale. For larger sites, a network of linked green infrastructure features should be possible responding to local character and sense of place. For smaller sites, assets such as green roofs or tree planting can link to the wider green infrastructure network. In all cases, green infrastructure should be strategically planned to function and connect as a living network at a local and landscape scale. Overall green infrastructure should be integral to the design and layout of new development particularly to encourage safe movement for people and wildlife. Connectivity to sites identified as valuable for nature outside the site should be considered. Also, how different types of green infrastructure inside and outside of the site will work in combination and complement each other. Also, how will the green infrastructure work in isolation and together in different conditions, such as extreme weather.

2.3.6   Even for relatively small sites producing a green infrastructure plan can bring benefits by taking a focused look at the site can contribute to biodiversity targets. The following are examples of sources which can provide further useful information on designing green infrastructure to address inequalities and meet needs:

- For health the Joint Strategic Needs Assessments (JSNA) or joint Health and Wellbeing Strategy will look at the current and future health and care needs to inform the planning and commissioning of health, wellbeing, and social care services within a local authority area,
- The Construction Industry Council's (CIC) Guide 'Essential Principles for Built Environment Professionals' sets out six essential principles of Inclusive Design.
- Building with Nature can be applied to green infrastructure projects within residential, commercial, or mixed-use development.
- National, county, district and local Landscape Character Assessments (LCAs) can provide information on the character of an area, as can townscape and historic character studies. Most National Parks and Areas of Outstanding Natural Beauty also have LCAs, and all have management plans that describe their area's key characteristics.
- The Biodiversity Metric 3.1 can measure the quality of and extent of habitat before and after construction and should be used for compliance with Biodiversity Net Gain requirements. These specify a minimum 10% increase in biodiversity by improving a site or providing off-site compensation.
- The Environmental Benefits from Nature tool is voluntary and can be used to indicate the wider benefits for people and nature from BNG, by looking at the direct impact of land use change on 18 ecosystem services.

Government policy and guidance, Evidence and Process tools for Step 3 Concept design

2.3.7   **Government Policy and Guidance**
- Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2021) National Model Design Code: Part 1 - The Coding Process
- Ministry of Housing, Communities & Local Government (2021) National Design Guide. Context and identity sections
- Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework chapter 15
- Natural England (2022) Prepare a planning proposal to avoid harm or disturbance to protected species

2.3.8   **Evidence**
- Natural England (2014) National Character Area profiles: data for local decision making
- National Park and AONB management plans, LCAs and statutory management plans – access via the relevant National Park or AONB website.
- Landscape Institute (2013) Green Infrastructure: An integrated approach to land use

2.3.9   **Process tools**
- Natural England (2021) The Environmental Benefits from Nature Tool - Beta Test Version
- Biodiversity metric 3.1 (2021)
- Natural England (2020) Climate Change adaptation manual
- Town and Country Planning Association (2017) TCPA Practical Guides - Guide 3: Design and Masterplanning
- Natural England and Department for Environment, Food & Rural Affairs (2014) Landscape and seascape character assessments
- Landscape Institute (2017) Townscape character assessment
- Historic England Historic Landscape Characterisation
- Construction Industry Council Essential (2017) Principles for achieving an accessible and inclusive environment.

2.4. Stage 4 – Funding and obligations

Overview

2.4.1   Understand how planning conditions, obligations or the Community Infrastructure Levy may be used by local planning authorities to secure and fund green infrastructure.

Detailed description

2.4.2   The costs of green infrastructure are such that they are unlikely to affect the viability of a development on their own, and interventions such as SUDS can reduce costs over time. In comparison to other requirements planning obligations green infrastructure is likely to require a lower initial financial commitment. Costs over time will depend on the nature of the green infrastructure and on the ongoing maintenance. Future maintenance costs are therefore an important parameter in determining the type and scale of green infrastructure.

2.4.3   Biodiversity Net Gain may provide an important long term funding mechanism for green infrastructure since habitats needs to be legally secured, managed and monitored for 30 years. Where BNG is required as part of development, this will need to be considered from the outset.

2.4.4   At this stage it can be beneficial to start to identify arrangements for funding for on-going management and maintenance. Factoring funding considerations into the design and implementation and balancing the costs with the benefits will be helpful. Local communities can sometimes assist with management. Tailoring provision to local needs will help make this attractive and can address some of the funding issues.

2.4.5   Depending on individual circumstances, there are a number of mechanisms used by Local Planning Authorities for securing local green infrastructure within and around development. These includes planning conditions, obligations including Biodiversity Net Gain or the Community Infrastructure Levy. Associated with this it is important to understand the relative priority the local authority attaches to using green infrastructure to deliver social and economic issues. For instance, using green infrastructure to improve health outcomes. Requirements for green infrastructure and the priorities which green infrastructure could help address should be checked with the local authority planning department. They should be able to explain how local authority social, health, environment and regeneration policy requirements can be delivered by green infrastructure. This can help with ensuring the right green infrastructure, in the right place, for the right purpose.

2.4.6   In terms of management and maintenance funding often single one off upfront payments are used. This has the advantage of less complexity but set payments over time can often provide advantages in locking in responsibility for the long term. Some local authorities are now reluctant to adopt green infrastructure. This should be established early on to make sure the right mechanisms and funding can be in place for the long term. Establishing separate bodies and community involvement can be considered. Using management companies and service charge levies as a way of funding is a common way of delivering ongoing maintenance. Understanding the mechanisms used and what the green

infrastructure component of this is likely to be, will affect the balance between achieving green infrastructure and other objectives.

Government policy and guidance, Evidence and Process tools for Step 4 Funding and obligations

2.4.7   **Government Policy**
- Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2022) Community Infrastructure Levy
- Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2021) Planning Practice Guidance Planning Obligations.

2.4.8   **Evidence**
- Natural England (2016) Putting economic values on green infrastructure improvements.
- Ozdemiroglu, E. (2019) Demystifying Green Finance: Valuing Nature Paper
- Hurst, M. (2019) Demystifying Cost Benefit Analysis: Valuing Nature Paper.
- Natural England (2014) Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2) (NERR057)

2.4.9   **Process tools**
- Landscape Institute (2013) Guidelines for Landscape and visual landscape impact assessment chapter 4.

2.5. Stage 5 – Technical design and manufacturing

Overview

2.5.1   Detailed green infrastructure proposals as part of planning applications should:
- Meet local plan policies and local design codes
- Be based on the evidence collected in previous stages
- Make use of landscape and other relevant specialists
- Integrate stakeholder views, including local communities

2.5.2   Ensure green infrastructure will be governed, managed, monitored, maintained and funded for the long term. Specify in the design:
- Techniques and approaches to maintain and where possible enhance local character, existing green infrastructure, and minimise adverse impacts
- Materials, planting and methods which maximise the planned multiple benefits of green infrastructure and respond to local character and local design codes

Detailed description

2.5.3   The technical design stage should make reference to the [Green Infrastructure Planning and Design Guide](#) and in particular detail in the chapters on the 'Building Blocks of Green Infrastructure', 'Designing Green Infrastructure for Multiple Functions' and 'Designing Green Infrastructure for Different Area Types', which sets out guidance on how to apply the Green Infrastructure Standards in different area types.

2.5.4   This stage should take account of the evidence about local needs collected from the earlier stages. Landscape architects and other specialists (for example sustainable drainage or ecologists) should be able to translate needs into green infrastructure provision to produce a more detailed green infrastructure plan for the proposed development. This can later form part of the planning application. Stakeholder views can be incorporated into the design. This might involve checking details with stakeholders particularly where green infrastructure elements are interdependent. Local communities can highlight what they value, priority issues and the kinds of local green infrastructure provision that would make a positive difference to their lives. There may also be relevant information in a local authority green infrastructure strategy.

2.5.5   The technical design stage should also include consideration of how to minimise impacts on any existing green infrastructure on and around the site during construction and use. Special consideration should be given to any sensitive landscapes, habitats, historic sites/features or vulnerable species. Developments should respond to the area's character. This can be through conservation, enhancement and restoration but can also include creating new character where appropriate. Timing of works can be important and ecological and landscaping technical expertise should be sought to help with this.

2.5.6   Thinking ahead to how the site will be governed, managed, monitored, maintained, and funded for the long term is critical at this stage. The technical design should fully take account of all these elements. Knowing who and how the site will be managed can greatly influence the design. For instance, a community who manage a site might have significant manual labour available but might lack expertise and funding for equipment. Whereas green infrastructure in a non-residential area like a business park is more likely to be managed by contractors with specialist equipment and expertise, although there may be interest from local employers to manage some areas as part of staff wellbeing programmes.

2.5.7   Consideration of the wider environmental and social aspects of the manufacturing and construction of green infrastructure should form part of the design phase. Sustainably sourced timber, local construction of materials and reused or recycled

products should be factored in. This will provide a positive climate change context for any development and reduce its impact.

2.5.8   The design should also be future proofed as far as possible by taking account of the likely impacts of climate change. In practice this means looking at the predicted changes in weather patterns. So for instance in locations which are likely to be drier having less areas of short mown grass and more drought resistant plants. Conversely in areas which may get wetter providing more water features and rain gardens.

2.5.9   Attention to detail in design can make the difference between the various elements of green infrastructure working well together and missed opportunities to maximise multiple benefits. In practical terms this means that the design and access statement for the development should not just explain the individual elements of green infrastructure but also how they work in combination. For instance, how SuDS can improve water quality and reduce flooding but also enhance wildlife corridors and improve non-motorised movement if planned well. Existing or potential biodiversity for enhancement will be identified in the Local Nature Recovery Strategy or green infrastructure strategy. Specifying the right species which are in keeping with the history of the site, the landscape or existing biodiversity can increase the sense of place. Engaging the correct expertise will ensure the planned benefits can be delivered in combination.

2.5.10   Pollution due to excessive nutrients can be an issue in freshwater habitats and estuaries. Natural England has issued advice and information for specific catchments where mitigation (such as nutrient neutrality) may be required. The provision of well-designed green infrastructure within development sites can help reduce nutrient export. Vegetation can trap or filter pollutants and sediment before it reaches watercourses, which is an important role in nutrient polluted catchments.

2.5.11   The Simple Index Approach Tool (developed by Susdrain) checks the sufficiency of proposed SuDS components in mitigating water quality risks to receiving water bodies and the relevant 'Design Conditions' necessary to manage each inflow or 'runoff area' on a site basis. The Benefits Estimation Tool also developed by Susdrain can be used to estimate the value of benefits of blue-green projects. It is helpful in providing a method to assign monetary value to a range of benefits that are not normally quantified.

Government policy and guidance, Evidence and Process tools for Step 5 Technical design and manufacturing

2.5.12 **Government Policy and guidance**
- Ministry of Housing, Communities and Local Government (2021) [Build back better high streets](#)

2.5.13 **Evidence**
- Monteiro R, Ferreira J, Antunes P (2020) [Green Infrastructure Planning Principles](#)

2.5.14 **Process tools**
- Design Council (2019) Design Review Principles and Practice. Available at: [Design Review: Principles and Practice - Design Council](#)
- Natural Resources Wales (2019) [Green Space and Well-Being a good practice guide for housing associations](#)
- Landscape Institute (2013) [Green Infrastructure: An integrated approach to land use](#)
- Scottish Government (2011) [Green Infrastructure Design and Placemaking](#)
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- Susdrain (2019) B£ST (Benefits Estimation Tool). Available at: [www.susdrain.org/resources/best.html](#)
- Natural England (2022) [Strategic solutions for nutrient neutrality](#)

2.6 Stage 6 – Construction and inspection

Overview

2.6.1 Ensure:
- Impacts on existing green infrastructure are avoided, and if impacts are unavoidable, minimised and compensated
- Inspections of landscaping, SuDS and green infrastructure planting involve an appropriate level of expertise

Detailed description

2.6.2 Poor construction and implementation can lead to disappointment for users of green infrastructure and reduce its effectiveness, which can impact on sale value. Conversely good construction and implementation can add to feelings of wellbeing and pride in a place and secure better returns on investment. Therefore, good communication about how a site is being taken forward and phases of construction can go a long way towards customer satisfaction and value. Having a nominated and visible person for users to speak to can help.

2.6.3 The impacts during construction on any existing green infrastructure both in and around the site should be minimised through best practice techniques and standards (for example British Standards on tree protection). Employers should ensure that all contractors should be made aware of the importance of the existing green infrastructure and any particular features so that they can be adequately protected. Bringing in the right expertise is crucial, such as professionals who understand the impacts on habitats. Regular inspections should take place to ensure protocols are being adhered to. This should happen throughout the construction contract to ensure that the green infrastructure included in the planning permission, is delivered and to the right quality. Account should be taken of timing to ensure that impacts on existing wildlife are minimised. This is particularly important for protected species such as bats.

2.6.4 Taking full account of existing ground conditions can save problems later. This can avoid compaction or waterlogging which can damage existing plants and trees on site and also make establishment of new planting more difficult or less successful. Care should be taken to check that landscaped slopes on the site are not greater than those agreed, as this might cause unwanted run off. Guarantees should be in place and checks carried out to make sure no invasive or diseased species are introduced within the planting. The effect of the wind particularly in exposed or coastal areas should be factored in to ensure plants aren't blown over. When appointing landscaping contractors, it is important to ask about their supply of stock and delivery times for new planting. This can ensure that the planting is put in at the right time and complements any phases of the development. It can also reduce the need for plant substitutions.

2.6.5 In terms of the protection of existing green infrastructure and inclusion of new habitats these should be included in both the Employer's Requirements and a Construction and Environmental Management Plan. The purpose should be to avoid, minimize and mitigate any environmental impacts on exiting green infrastructure and be clear about the size quality and purposes of new green infrastructure. However simply expecting contractors to understand all aspects or abide by the Plan may not be enough and training on specific tasks and potential issues can be important.

2.6.6 Inspections prior to handover to management organisations should not be rushed and include a suitable level of expertise for each aspect of green infrastructure. This should ensure that any new green infrastructure asset is inspected for both quality and functionality. Where resources allow involving the local planning authority can help to lend weight to inspections. It is also vital to assess contractor's warranties very carefully including their expected lifespan of the planting they provide. Particular attention to and what they will do if it fails is worth checking. Warranties should ensure that not only any specimens lost are replaced like for like, but also at the right time and in a timely manner.

Government Policy and Guidance, Evidence and Process Tools for Stage 6 – Construction and Inspection

2.6.7 **Government Policy and guidance**
- Ministry of Housing, Communities & Local Government (2021) [National Design Guide](#)

2.6.8 **Evidence**
- HM Government (2016) [Local Action Project Final report](#)

2.6.9 **Process tools**
- CIRIA (2020) [Guidance on the construction of SuDS (C768F)](#)
- HM Government (2018) [Consultation principles](#)

2.7. Stage 7 – Handover

Overview

2.7.1 Ensure to:
- Involve communities and other stakeholder groups in discussions on long-term management and maintenance.
- Hand over a maintenance and management plan to the appropriate stakeholder.

Detailed Description

2.7.2 Involving communities and other stakeholder groups in the management and maintenance of green infrastructure can help to ensure it meets the needs of local communities in the long term. One advantage of involving communities is that they are likely to be responsive to adapting the design in response to use, management and maintenance. Community involvement in looking after green infrastructure can be partial and voluntary, based on looking after one aspect, such as tree wardens. Or it can be more wholescale with the community setting up a trust to manage a piece of land such as a community orchard. The level of liability will often determine the level of community ownership or management. Community groups are unlikely to want or be able to take on the liabilities associated with formal equipped play spaces. Hybrid approaches are possible with organisations such as town or parish councils taking some responsibilities or ownership and a community group undertaking maintenance.

2.7.3 Where management companies and service charge levies are used it is vital that proactive communications are well established at the outset between users and maintainers of the green infrastructure.

2.7.4   Detailed hand over of the maintenance and management plans to the appropriate stakeholder(s) should be planned for well in advance. The multifunctional nature of green infrastructure means that maintenance can be complex. There may be a need for biodiversity management plans for wildlife areas such as a biodiversity gain plan where BNG in required. There may also be a need for a habitat management and monitoring plan, or a maintenance and adoption plan for Sustainable Drainage Systems (SuDS), as well as maintenance schedules for street trees, sports provision and play spaces.

2.7.5   To minimise issues adoption and handover of different elements should take place at the same time where possible. Poor management of one element can have knock on effects on others. For instance, areas left bare can cause soil erosion leading to contamination of water courses, resulting in reduced biodiversity and poor quality green and blue spaces. To maximise benefits for the community and wildlife and to avoid conflicts, the management plans and processes should be viewed in combination and assessed together before handover. Where there is more than one management organisation involved, defined responsibilities for each green infrastructure element, coordination and communication methods such as regular meetings should be agreed. Where community groups or residents are taking on aspects of management, they should be fully informed about the integrated management of the site as whole, and not left to manage one aspect in isolation.

2.7.6   Where possible management arrangements and funding should be in perpetuity and beholden on future landowners. Measures such as conservation covenants can assist in securing long term management of land for wildlife protection and heritage purposes. Improvements through Biodiversity Net Gain should be secured for a minimum of 30 years through associated funding.

Government Policy and guidance, Evidence and Process tools for Stage 7 Handover

2.7.7   **Government Policy and guidance**
- Local Government Association (2017) [Building regulations and building control](#)
2.7.8   **Evidence**
- Designing Buildings (2021) [Handover of the construction site to the client](#)
2.7.9   **Process tools**
- Susdrain (2015) [Sustainable Drainage Systems (SuDS) maintenance and adoption options (England)](#)

2.8. Stage 8 - Actively Monitor

Overview

2.8.1   Monitor:
- The performance of the green infrastructure against needs
- User feedback
- Levels and costs of maintenance and management

Detailed description

2.8.2   The Natural England Green Infrastructure Standards sets out that green infrastructure delivered within (or associated with) major new developments should be managed, maintained and monitored for a minimum of 30 years.

2.8.3   Green infrastructure needs to be monitored to check that it is performing to achieve the designed multiple benefits. This monitoring can help inform how to successfully incorporate green infrastructure in future developments. To measure the performance of green infrastructure effectively requires more than one approach. Some elements of green infrastructure will have primary function which is obvious at a particular moment. For instance, does a swale remove all the water in times of heavy rainfall. Other elements may require checks at regular intervals, such as seasonal examinations of planting. Other may require observational recording such as for biodiversity. Investigating how people use sites may require a mixture of survey and observation. Some of this can be done electronically through devices such as people counters which record how many people use a footpath. The point is that effective monitoring will require a long term timed plan, an ability to respond to circumstances and dedication to do it properly. The introduction of BNG requirements will mean that monitoring for biodiversity should be in place for at least 30 years.

2.8.4   Realistically in times of limited resources other aspects may not get prioritised. To overcome this, it is worth considering:
- working with local government
- community involvement

2.8.1   The local authority, parish or town council may undertake surveys or monitoring work connected with updates to the local plan, changes to services, pressure from local people and so on. It is worth being in contact local government so that information from these surveys can be used.

2.8.2   The local community will have valuable insights and may be interested in being involved in monitoring, for example through Citizen Science recording the presence of particular species using photographs or video. Involving stakeholders

in the monitoring of green infrastructure can also help to ensure it meets the needs of local communities in the long term. Regular and effective communication between management organisations and users will be key. This should provide opportunities for feedback and communication on how issues which are raised are being tackled. Satisfaction surveys can be a useful snapshot. green infrastructure is likely to be dynamic and responding to how it changes and variations in needs from the local community will require a flexible approach.

2.8.3   Providing mechanisms for long term engagement can be beneficial. Some enlightened developers have worked proactively with schools to provide education packs so that the green infrastructure becomes an on-going educational resource. Approaches like this can provide targeted user feedback especially if there is direct engagement with specific users and commitment to ongoing education on the use and benefits of the green infrastructure.

2.8.4   Assessing the financial costs of maintenance against budgets should be relatively straight forward on a yearly basis in most cases. What is slightly harder to establish is trends which may affect the costs. So, for instance what are the causes of higher costs. Taking a step back to assess factors linked to climate change such as increased numbers of users due to warmer weather or greater run off due to higher rainfall can help with financial planning and increase responsiveness to impacts on the green infrastructure.

Government policy and guidance, Evidence and Process tools for Stage 8 - Actively monitor

2.8.5   **Government Policy and guidance**
- HM Government (2018) Green Book

2.8.6   **Evidence**
- Designing Buildings (2021) Post occupancy evaluation of completed construction works.

2.8.7   **Process tools**
- Environmental Change Institute (2019) Tools for Planning and Evaluating Urban Green Infrastructure: Bicester and Beyond (2109)
- Susdrain (2017) Maintenance of SuDS

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