



GMCA

**GUIDANCE FOR GREATER
MANCHESTER
– EMBEDDING GREEN
INFRASTRUCTURE PRINCIPLES**

FINAL

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Version 7



FOREWORD

This document is written in the format of guidance to Greater Manchester's Local Authorities (LAs). It is part of a commission undertaken by WSP for the Greater Manchester Combined Authority (GMCA) to provide guidance on the implementation of Natural England's national principles for green infrastructure standards across the Greater Manchester area, as set out in the narrative supporting policy GM-G 9 of the Greater Manchester Spatial Framework (GMSF).

This guidance is provided as a document that the GMCA can amend and update to meet requirements and ensure it is based on the most up to date information and discussions between interested parties. It includes notes relating to further recommendations and ongoing actions, to assist the GMCA with editing and finalising the guidance in due course, as the work on embedding green infrastructure principles in Greater Manchester progresses. It is intended that guidance functions as an internal document for use by the Greater Manchester LAs.

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1 OVERVIEW AND INTRODUCTION

1.1 GREEN INFRASTRUCTURE IN NATIONAL PLANNING POLICY

The 2019 National Planning Policy Framework (NPPF) sets out a strategic policy requirement for ensuring sufficient provision for conservation and enhancement of green infrastructure. More detail is provided in the updated National Planning Practice Guidance (NPPG), which 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.

As set out in the NPPG, green infrastructure can facilitate the following planning and development goals:

- **Building a strong, competitive economy**

Green infrastructure can drive economic growth and regeneration, helping to create high quality environments which are attractive to businesses and investors.

- **Achieving well-designed places**

The built environment can be enhanced by features such as green roofs, street trees, proximity to woodland, public gardens and recreational and open spaces. More broadly, green infrastructure exists within a wider landscape context and can reinforce and enhance local landscape character, contributing to a sense of place and natural beauty. As such it can help meet landscape requirements, as well as requirements for development affecting the green belt.

- **Promoting healthy and safe communities**

Green infrastructure can improve the wellbeing of a neighbourhood with opportunities for recreation, exercise, social interaction, experiencing and caring for nature (e.g. through voluntary conservation work), community food-growing and gardening, all of which can bring mental and physical health benefits. The provision of suitable accessible green space (including sports fields, allotments and parks) can help to reduce health inequalities in areas of socio-economic deprivation and meet the needs of families and an ageing population. Trees, shrubs and hedges can also help to reduce air pollution and noise.

- **Mitigating climate change, flooding and coastal change**

Green infrastructure can contribute to carbon storage, cooling and shading, opportunities for species migration to more suitable habitats and the protection of water quality and other natural resources. It can also be an integral part of multifunctional sustainable drainage and natural flood risk management. Furthermore, well-designed walking and cycling routes can also encourage a shift towards non-motorised forms of transport for short journeys, thus providing a green transport solution.

- **Conserving and enhancing the natural environment**

High-quality networks of multifunctional green infrastructure contribute a range of benefits, including ecological connectivity, and facilitating biodiversity net gain and nature recovery networks. Creating and enhancing green infrastructure can also help to meet legal requirements for protected sites and species, for example through the provision of habitat, or through the creation of 'suitable alternative natural greenspace' (SANGs) to reduce human disturbance of sensitive areas.

1.2 THE APPROACH IN GREATER MANCHESTER

Green infrastructure is not a new concept in Greater Manchester – local plan policies on green infrastructure (and in some cases, green infrastructure strategies) have been established at LA level for some time. What Greater Manchester has lacked is strategic policy setting out an overarching approach to green infrastructure across the city region.

The draft GMSF therefore sets out to deliver a high-quality network of green infrastructure to support sustainable growth and ensure ecological and economic resilience across the region. Policy GM-G 2 requires new and existing green infrastructure to be integrated into new development where practicable, to protect, enhance and expand the network. Key priorities align with those outlined in the 25-Year Environment Plan and include the provision of diverse recreational opportunities, enhancement of biodiversity and habitat connectivity, provision of green travel routes, increased sense of place and connection with nature, climate adaptation and improved water and air quality.

Within this context, Policy GM-G 9 outlines the intention to develop 'Principles and Standards for a Greener Greater Manchester'. This is based upon the 'Principles for Good Green Infrastructure' set out in the National Framework of Green Infrastructure Standards developed by Natural England, and aims to facilitate delivery of a range of critical ecosystem service benefits. These principles are described as follows (other GMSF policies supported by the principles are shown in parentheses):

- **NP01: Engagement and multifunctionality (GM-G 6)**
Partnership working and stakeholder engagement (including local authorities, developers, communities and others) to co-plan and deliver good multifunctional GI as essential infrastructure that is integrated with environmental, social, health and environment policy as part of place making.
- **NP02: Managed, maintained and funded (GM-G 2, GM-Strat 13)**
Governed, managed, monitored, maintained and funded for the long term involving stakeholders and local communities to meet local needs.
- **NP03: Strategically planned (GM-G 2, GM-G 8, GM-Strat 13)**
Strategically planned to function and connect as a living network at local and landscape scale.
- **NP04: Well designed (GM-G 1, GM-G 2)**
Well-designed from the outset, responding to and enhancing local character and sense of place.
- **NP05: Multiple benefits (GM-G 2, GM-S 4, GM-E 1)**
Delivers multiple benefits for people and nature through a joined-up approach that is underpinned by quality, condition and location of GI assets.
- **NP06: Meets people's needs (GM-G 6)**
Meets peoples' needs (for ecosystem services) and addresses inequalities in provision of GI.
- **NP07: Health and wellbeing (GM-G 2, GM-C 3, GM-E 6, GM-S 6)**
Delivers essential services integral to health and wellbeing.
- **NP08: Biodiversity and nature recovery (GM-G 2, GM-G 10)**
Delivers biodiversity net gain and wider environmental net gains and forms an important component of nature recovery networks.
- **NP09: Resilience to climate change (GM-G 2, GM-S 4, GM-E 1)**
Makes places more resilient to climate change, flooding and helps meet zero carbon targets.
- **NP10: Drives value (GM-G 2, GM-Strat 2, GM-Strat 5)**
Drives regeneration and creates value.

By setting out a framework of principles through the GMSF, the GMCA seeks to encourage a standardised, ecosystems approach to green infrastructure across the city region. Most green infrastructure will continue to be delivered via local plans, and it will be up to individual LAs to decide how best to deliver the principles at local level in order to reflect the nuances in green infrastructure which can occur between the various districts. The rest of this roadmap provides advice and guidance to LAs on the options available to them to achieve this.

1.3 HOW DOES GREEN INFRASTRUCTURE LINK TO RELATED CONCEPTS?

Green infrastructure is a strategically planned network of multi-functional green space and other green features, urban and rural, which can deliver quality of life and environmental benefits for communities. It is important to understand the link between green infrastructure and related environmental concepts within the GMSF, including blue infrastructure, Biodiversity Net Gain, Nature Recovery Networks, natural capital, ecosystem services, and landscape. These concepts, and their link to green infrastructure, are explained in Table 1 below.

Table 1: Spatial environmental concepts and their link to green infrastructure

KEY TERM	DEFINITION	LINK TO GREEN INFRASTRUCTURE
Blue infrastructure	Blue infrastructure is a sub-set of green infrastructure and is made up of a range of water-related assets such as streams, rivers, canals, ponds, lakes, wetlands and sustainable drainage systems (SuDS).	Blue infrastructure is a vital part of green infrastructure and includes all water-related assets.
Biodiversity Net Gain (BNG)	An approach to development that leaves the natural environment in a measurably better state than it was initially. It uses 'biodiversity units' to quantify biodiversity before and after site development to ensure that a net gain in biodiversity is achieved.	Through delivery of new habitats for wildlife (i.e. hedges, woodlands or grasslands) on- and off-site, BNG also increases the amount and quality of green infrastructure. However, the focus of BNG is on wildlife rather than people, so it may not address issues of accessibility and inclusivity that are important for green infrastructure. BNG is specifically addressed through Principle NP08 of the National Framework.
Nature Recovery Network (NRN)	A joined-up system of places important for wild plants and animals, on land and at sea. It allows plants, animals, seeds, nutrients and water to move from place to place and enables the natural world to adapt to change.	Placing green infrastructure in strategically important locations for the purpose of ecological connectivity can ensure that spaces for nature are bigger, better and more joined up. However, the focus of NRNs is on wildlife rather than people, so these may not address issues of accessibility and inclusivity that are important for green infrastructure. NRNs are specifically addressed through Principle NP08 of the National Framework.

<p>Natural capital</p>	<p>Natural capital is that part of nature which directly or indirectly underpins value to people. A natural capital asset is a distinctive component or grouping of natural capital, including ecosystems, species, freshwater, soils, minerals, the air and oceans. Natural capital stock is defined as the extent and condition of a natural resource.</p>	<p>Green infrastructure is a sub-set of natural capital, and can be thought of as a specific natural capital asset. Enhanced provision of green infrastructure (both in terms of quality and quantity) results in an increase of the stock of natural capital within the Greater Manchester region.</p>
<p>Ecosystem services</p>	<p>Ecosystem services are the many and varied benefits that humans freely gain from the natural environment. Flows of ecosystem services are provided from natural capital assets, and depend on the stock (i.e. extent and condition) of natural capital. These ecosystem services can provide economic, social, environmental, cultural, or spiritual benefits, and the value of these benefits can be understood in qualitative, quantitative, or monetary terms.</p>	<p>Enhanced provision of green infrastructure (both in terms of quality and quantity) results in increased provision of ecosystem service benefits within the Greater Manchester region. For example, more parks could provide more aesthetic value, space for recreation and leisure, and valuable habitats for wildlife. However it should be noted that there may be trade-offs between particular ecosystem services. Multiple ecosystem services are specifically addressed through Principle NP05 of the National Framework, whilst the provision of specific ecosystem services to meet community needs are addressed through Principles NP06-09. The value of ecosystem services is reflected in Principle NP10.</p>
<p>Landscape</p>	<p>The visible features of an area of land, its landforms, and how they integrate with natural or man-made features. A landscape includes the physical elements of landforms such as mountains, living elements of land cover including indigenous vegetation, human elements including different forms of land use or buildings and transitory elements such as lighting and weather conditions. Landscape Character Assessment (LCA) is the process of identifying and describing variation in character of the landscape.</p>	<p>Urban and rural green space and other green features form a part of the wider landscape. It is important that new green infrastructure interventions are appropriate for and complement the local landscape character. Landscape character is specifically addressed through Principle NP04 of the National Framework.</p>

GMSF Policy GM-G 9 also has clear links with a range of planning initiatives for the natural environment that are currently being progressed in Greater Manchester. The key planning/policy initiatives at city region level, and how they link to green infrastructure principles, are set out in Figure 1 below.



Figure 1: Integrating green infrastructure principles within other Greater Manchester policy initiatives

The adoption of green infrastructure principles in Greater Manchester are intended not as a separate workload/responsibility on LAs, but as a means of tying together the wider environmental and quality of life benefits required by other legislation and policy (whether at national, regional, or local level). By clearly showing how good green infrastructure implemented at LA level can contribute to meeting other policy objectives, such as health and wellbeing, climate change adaptation, or Biodiversity Net Gain, additional resources may become available.

Central to meeting wider objectives for people and nature is putting ‘place’ at the heart of a spatial framework for a district/area. For example, the National Framework of Green Infrastructure Standards includes the following place-based outcomes that good green infrastructure can achieve:

- Inclusive and equitable places;
- Active, healthy places;
- Beautiful, safe, and well-designed places;
- Nature connected places;
- Resilient places; and
- Prosperous, investible, valued and smart places.

To set objectives for a place that contribute to the green infrastructure principles, it is important to understand what objectives will relate to nature recovery (biodiversity priorities) and those that relate to wider ecosystem service provision (people/socio-economic priorities). A place-based framework could establish integrated objectives for both people and nature that are connected to potential means of investment to deliver net gains for biodiversity and wider natural capital. Figure 2 below attempts to relate these spatial environmental concepts to green infrastructure principles, within a wider place-based approach.

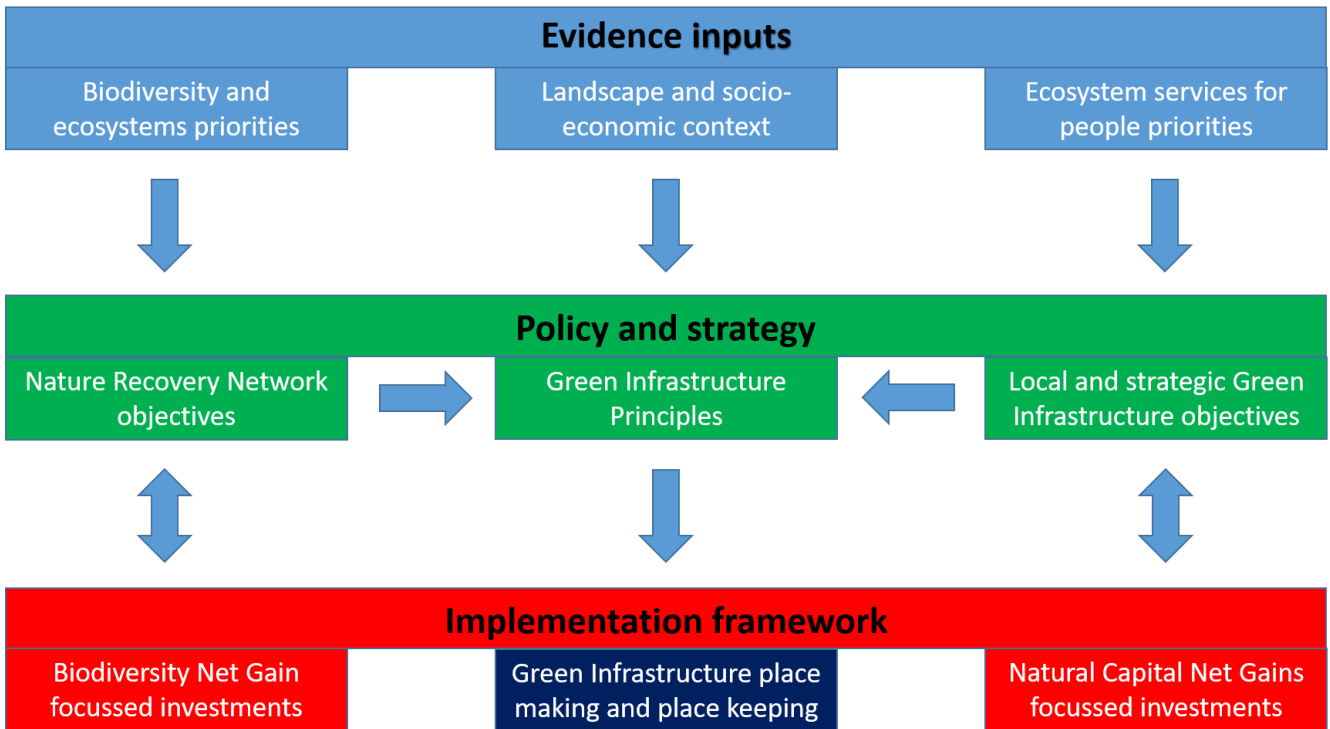


Figure 2: A place-based framework for integrating green infrastructure with other environmental concepts

1.4 THE PURPOSE OF THIS GUIDANCE

The purpose of this guidance is to set out the options for implementation of the National Principles for Green Infrastructure Standards within the spatial planning and development management functions of the ten LAs across the city region. This guidance is therefore an explanation of how to practically embed green infrastructure principles within local plans and site allocations. The guidance will also provide a means to coordinate the development and implementation of the Greater Manchester approach to green infrastructure.

The main outcomes of this guidance include:

- Strengthening of links to other city region-scale policies, plans and strategies on related environmental concepts (sections 1.2 and 1.3);
- Guidance setting out the process for embedding the national principles for green infrastructure into planning policy, strategic allocations, and development management (section 2 and Annexes A and B);
- Options for how areas of new and existing green infrastructure can be managed, maintained and monitored to deliver ecosystem services over the medium to long term (section 2.4); and
- Detail on the resources available for delivering green infrastructure principles and standards, including spatial data and maps, new and existing tools and standards, and other partners (section 3 and Annex C).

2 EMBEDDING GREEN INFRASTRUCTURE INTO PLANNING

Fulfilling the ‘National Principles for Good Green Infrastructure’ at LA level is important irrespective of the stage LAs are at with their local plans and strategic allocations, and applies whether sites are of local or strategic importance, and publicly or privately owned. It is therefore recommended that each LA in Greater Manchester develops an overarching ‘Green Infrastructure Framework’, specific to their area. This should be seen as a useful and important starting point for Greater Manchester’s LAs, underpinning all other planning decisions of relevance to green infrastructure.

How to go about developing a Green Infrastructure Framework is described in Section 2.1 below. The following sections provide guidance on how LAs can apply green infrastructure principles to more specific planning situations: developing local plans and Supplementary Planning Documents (SPDs) (Section 2.2); identifying strategic allocations and associated masterplanning (Section 2.3); and responding to planning applications from developers (Section 2.4). This is followed by advice on managing and monitoring green infrastructure focused on community needs (Section 2.5). Figure 3 below shows how this process all links together.

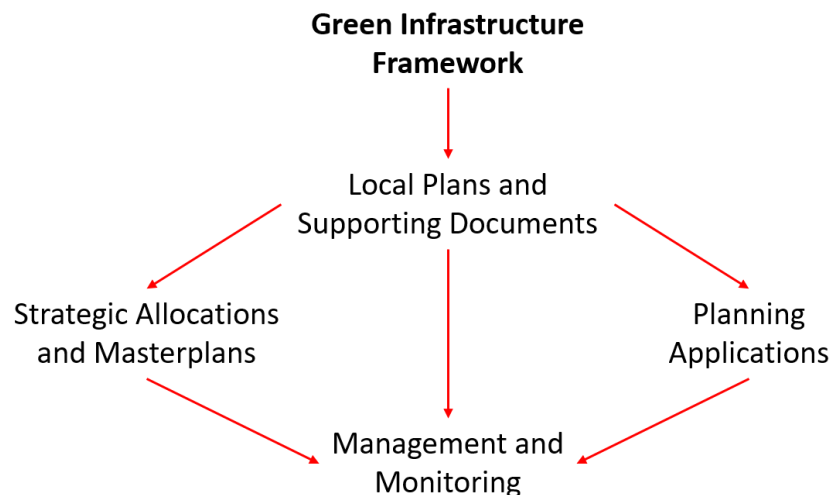


Figure 3: Proposed process for embedding green infrastructure principles in local planning

2.1 GREEN INFRASTRUCTURE FRAMEWORK

The Green Infrastructure Framework should set out the overarching principles for good green infrastructure, along with local aspirations as to how these should be delivered, and more specific place-based objectives. It should also include a recommendation that green infrastructure is considered at the earliest possible opportunity in the plan-making, masterplanning, and development management cycles.

The stepped process set out in Figure 4 below has been proposed to guide LAs through the development of a LA-specific Green Infrastructure Framework. Additional guidance on each of these steps follows.



Figure 4: Proposed approach for developing an overarching Green Infrastructure Framework

■ **Green infrastructure approach**

Check your approach to green infrastructure planning against the ten National Principles by asking yourselves the following questions:

- NP01: Which stakeholders do you involve in GI policy development, and how?
- NP01: To what extent is your green infrastructure designed and managed for multi-functionality?
- NP02: How is your green infrastructure managed and maintained over the short and long term?
- NP02: How do you determine which green infrastructure to finance, and how do you resource this?
- NP02: Do you monitor the quantity or quality of your green infrastructure, and if so, how?
- NP03: Do you plan your green infrastructure to fit into the wider strategic network?
- NP03: Do you tie green infrastructure planning in with other strategic objectives, such as nature recovery or landscape objectives?
- NP04: How do you ensure that new green infrastructure is well designed and fits in with the local landscape/townscape?
- NP05: Do you know which ecosystem services your green infrastructure is delivering?
- NP05: How do you identify and ensure that your green infrastructure is providing multiple benefits?
- NP05: Are you aware of synergies and trade-offs in the provision of ecosystem services from green infrastructure, and how to manage these to your advantage?
- NP06: Do you know where you have gaps in green infrastructure provision?
- NP06: Do you know what the needs and preferences of local communities are regarding green infrastructure?
- NP06: How do you account for these needs and preferences when improving the quality and functionality of existing and new green infrastructure?
- NP06: What are you doing about inequalities and inequity of both provision and quality of green infrastructure in your LA?

- NP07: Do you know where to target green infrastructure to help deliver the best health outcomes?
- NP07: Does your green infrastructure encourage more active lifestyles?
- NP07: Do you actively seek to create environments that help people maintain and improve good mental health? How does green infrastructure planning and design fit into this?
- NP07: Do you design green infrastructure in order to manage environmental hazards such as air quality or local issues such as road safety?
- NP08: Do you use green infrastructure for delivering net gains in biodiversity?
- NP08: Do you seek to create networks of green infrastructure that will help nature recovery in your LA?
- NP09: To what extent do you use green infrastructure as a nature-based solution to climate change mitigation in your LA?
- NP09: To what extent do you use green infrastructure as a nature-based solution to climate change adaptation in your LA?
- NP10: In what ways do you use green infrastructure to contribute to local place making and create better places in which to live and work?
- NP10: Do you use, or encourage the use of, green infrastructure to make development (more) acceptable to communities?
- NP10: Do you target those areas where green infrastructure can contribute to the regeneration of existing communities or make less attractive places more investable?
- NP10: Are you aware of the value of your green infrastructure (e.g. in monetary terms), and how this can be enhanced?

■ **LA needs**

Identify community and environmental needs in your LA that could be addressed through green infrastructure creation or enhancement. This should involve the use of existing spatial data on community environmental issues as described in Section 3.1, which identifies areas of surface water flooding, urban heat islands, poor physical and mental health etc within Greater Manchester, weighted by population. Local level spatial data and non-spatial data should also be used to identify community and environmental needs in your LA.

■ **Policy linkages**

Make linkages to relevant existing policies and initiatives in your LA and at GM level. This could include, for example, a Local Plan policy on improving healthy lifestyles, as well as emerging national government initiatives reflected through GM level documents such as the Biodiversity Net Gain Guidance or Natural Capital Investment Plan (see section 1.3 for more detail). Supplementary Planning Documents already produced in your LA that are of relevance to green infrastructure (such as green space, biodiversity and flood risk strategies) should be brought in to sit under this overarching framework, as they will contribute to delivering the Principles.

■ **Local aspirations**

Develop aspirations for what each National Principle will mean in your LA. This should be based on the information obtained in the previous steps, i.e. the identified community and environmental needs of the LA, as well as existing LA priorities set out in Local Plans and other LA documents. This will help to focus the application of the National Principles on what is of most relevance locally in your area. For example, for LAs declaring climate emergencies, addressing NP09 may be of particular importance. This could result in an aspiration to increase tree canopy cover in key areas across the LA to reduce the urban heat island effect and surface water flooding. If engaging more successfully with communities is a priority in your LA, then perhaps focus on NP01 and NP06 to help achieve community buy-in and even stewardship of local green spaces.

■ **Place-based Objectives**

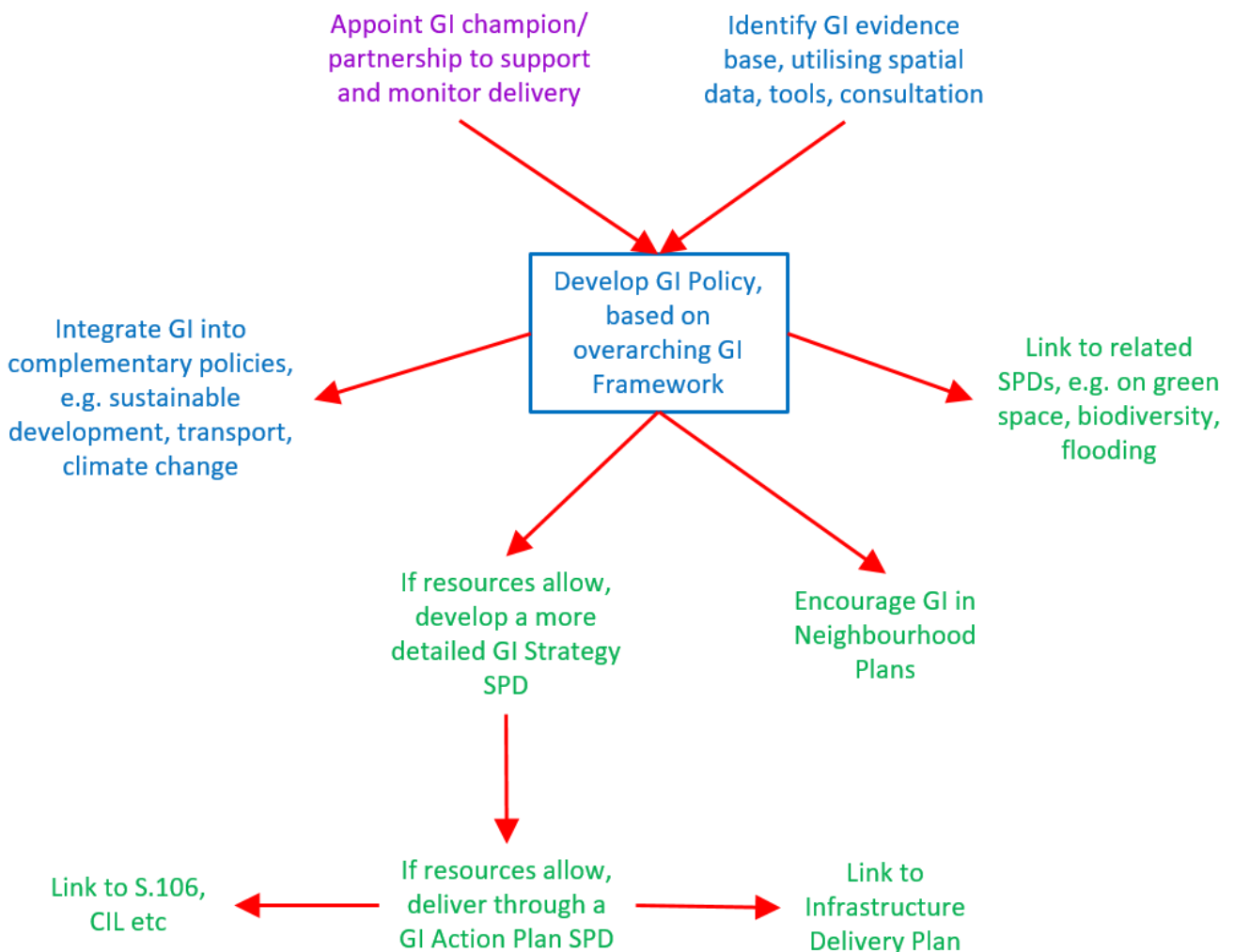
Set place-based objectives to deliver improvements in the places where they will really make a difference – especially where resources are already stretched. This should involve the use of existing spatial data on community environmental issues as described in Section 3.1. For example, if climate change adaptation is a priority in your LA, and mapped or other data suggests that surface water flooding is a particular issue in the town centre, then focus on improving the resilience of the town centre through installing sustainable drainage systems such as swales, street trees or green roofs.

■ **Local standards**

Consider setting qualitative or numerical standards for green infrastructure provision through new developments. Some standards may be imposed by government (e.g. the forthcoming Environment Bill will mandate biodiversity net gain of at least 10%), whilst others may be recommendations (e.g. accessible natural greenspace of at least 2 hectares in size within 300 metres of home). At LA level it may be possible to impose more stringent requirements on developers in particular locations, should you wish to do so. See section 3.2 for more detail on standards.

2.2 PLANNING POLICY

An example of the process an LA may follow for embedding green infrastructure principles in planning policy is shown in Figure 5 below; additional detail follows. The process attempts to reflect a logical sequence of delivery; however, it is recommended to apply it as appropriate for the local context.



Key: Governance; Local Plan Review; Supporting Documents

Figure 5: Proposed process for embedding green infrastructure principles in planning policy

Local Plans

Overtime, as local plans are refreshed, the Greater Manchester LAs should work towards including in their local plan a green infrastructure policy that embodies the Green Infrastructure Framework discussed in Section 2.1 above. LAs should therefore establish appropriate objectives for the local plan green infrastructure policy, incorporating aspirations for how each National Principle can be met in the LA; being specific to places where appropriate, including town centres, gateways, and areas in need; and setting qualitative and/or numerical targets and standards. It is also helpful to include requirements for multifunctionality. The green infrastructure policy should complement both GMSF Policy GM-G 9 (with the addition of local interpretation and context), and existing policies within the plan (to ensure they are mutually supportive).

As the National Principles are newly developed, there is no existing green infrastructure policy that embodies this approach. Nevertheless, some LAs are taking an ecosystems approach to planning more generally, e.g. Birmingham City Council, the West of England partnership, and the South Downs National Park Authority, and viewing these policies may be of use to the Greater Manchester LAs.

Each LA should consider what information is needed as part of the local plan evidence base to inform developing policy on green infrastructure. The resources described in section 3 are recommended in the first instance (particularly regarding spatial data), ideally supplemented by local data where available. Local plan consultations present an ideal opportunity to engage with wider stakeholders. Where local plan documents are being prepared, specific questions relating to green infrastructure standards could be included, as these could yield helpful information to inform policy – particularly regarding community ecosystem service priorities.

As well as developing new policy, LAs should ensure that green infrastructure (especially principles for achieving good green infrastructure) is referred to in complementary local plan policies, such as those addressing sustainable development, transport, or climate change. Including green infrastructure in spatial aspects of local plans is also recommended – see examples in Annex A.

An appropriate governance framework (perhaps including a green infrastructure partnership and/or political champion) is necessary to show commitment and deliver officer resources for ongoing implementation and monitoring of any green infrastructure policy.

Supporting Documents

In addition to a policy within their local plan, if resources allow, the Greater Manchester LAs may wish to formalise green infrastructure principles and standards within a SPD such as a Green Infrastructure Strategy (e.g. as produced by Manchester City Council). These need to be evidence-based and include assessments of the quality and quantity of current green infrastructure (using the tools described in section 3.2) and any gaps in provision.

The Green Infrastructure Strategy should inform and be informed by other relevant plans, strategies and local priorities to identify opportunities for multiple benefits, co-funding and avoid potential conflicts. These should be reported within the GI Strategy, but would include green space, biodiversity and flood risk strategies, but also the Infrastructure Delivery Plan. Arrangements for funding need to be identified as early as possible, and factored into the design and implementation, balancing the costs with the benefits. By demonstrating multiple benefits and reflecting local priorities, the GI Strategy may identify multiple funding streams and staff capacity for delivery.

Many Green Infrastructure Strategies are aspirational in nature; to successfully deliver high quality green infrastructure in perpetuity, it is important that the Strategy is accompanied by a regularly updated and fully costed Action Plan that sets out resourcing, responsibilities, due dates and specific measurable results that can be monitored. The action plan should include specific infrastructure items that feed into specific spatial policies (e.g. infrastructure/quality requirements for housing allocations; and specific policies for significant green infrastructure interventions such as a strategic off-road cycle route). Estimating the costs of delivering the various green infrastructure interventions and publishing these in the Action Plan (and possibly also the Local Plan and/or Infrastructure Delivery Plan), is important so developers can budget for it and tailor their land options accordingly.

Meeting community needs through the provision of green infrastructure will also be an important factor in many neighbourhood plans. The recommendations in this document are therefore also applicable to communities and their enablers.

2.3 STRATEGIC ALLOCATIONS AND MASTERPLANNING

An example of the process an LA may follow for embedding green infrastructure principles in strategic allocations is shown in Figure 6 below; additional detail follows. The process attempts to reflect a logical sequence of delivery; however, it is recommended to apply it as appropriate for the local context.

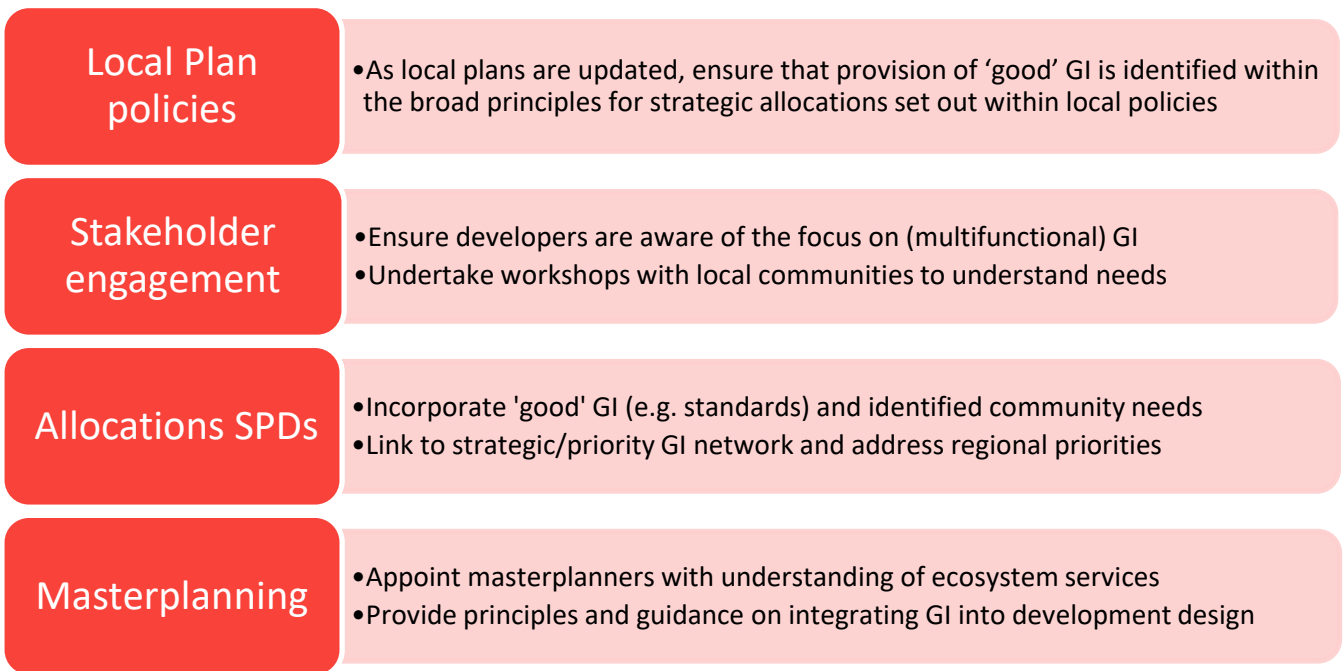


Figure 6: Proposed process for embedding green infrastructure principles in strategic allocations

It is recommended that provision of ‘good green infrastructure’ is identified within the broad principles for strategic allocations set out as local plan policies. Strategic allocations are likely to be the subject of close working between the Greater Manchester LAs and any identified developers, and will generally involve some form of detailed masterplanning – often in the form of SPDs. Strategic allocations SPDs present an excellent opportunity for undertaking early evaluation of potential ecosystem service provision for addressing wider community needs for each site (making use of the community environmental issues maps and ecosystem services opportunity maps described in section 3.1). This is also the opportune time for identifying existing green infrastructure features to avoid and protect in line with the mitigation hierarchy (see the separate BNG guidance).

The scale of these developments will be such that there should be opportunities to make significant improvements to Greater Manchester’s strategic green infrastructure network (as shown in the ‘Greater Manchester green infrastructure priority map’ (Figure 8.2) in the draft GMSF), and address regional priorities. At an early stage there is the opportunity to work with stakeholders to develop a list of high-level options for delivering green infrastructure for each strategic allocation. Emphasis should be placed on the multifunctionality of green infrastructure, so that multiple community and environmental benefits can be delivered on one site. For some allocations, it will be apparent that there are significant opportunities within the development site itself, and for others, focus may be more on opportunity areas outside the development boundary.

Pre-application discussions should highlight the need to integrate high quality green infrastructure within development design. Establishing the processes necessary to facilitate this early engagement on strategic allocations should help develop good practice for early engagement on smaller developments. Masterplans should provide principles and guidance, but should not overly constrain the development.

Key actions to take in order to embed green infrastructure principles within strategic allocations and masterplanning include:

- Providing the right evidence at the right time (using plans and quantitative measures wherever possible);
- Where possible, using independent masterplanners that understand and adopt an ecosystem services-based approach (ensuring this is explicit in their brief);
- Obtaining stakeholder input (reflective of local age and income distribution) through workshops in communities (though this is resource intensive in the short-term, it smooths the process in the long run);
- Quantifying and representing spatially the requirements for green infrastructure interventions, as well as providing qualitative information on what makes for 'good green infrastructure';
- Listing and costing out the green infrastructure requirements/interventions.

Teignbridge District Council has produced a 'green structures' design guide to inform strategic allocations (and planning applications) which may be of use – see Annex B (Figure 11) for further detail.

2.4 DEVELOPMENT MANAGEMENT

An example of the process an LA may follow for embedding green infrastructure principles in development management is shown in Figure 7 below; additional detail follows. The process attempts to reflect a logical sequence of delivery; however, it is recommended to apply it as appropriate for the local context.

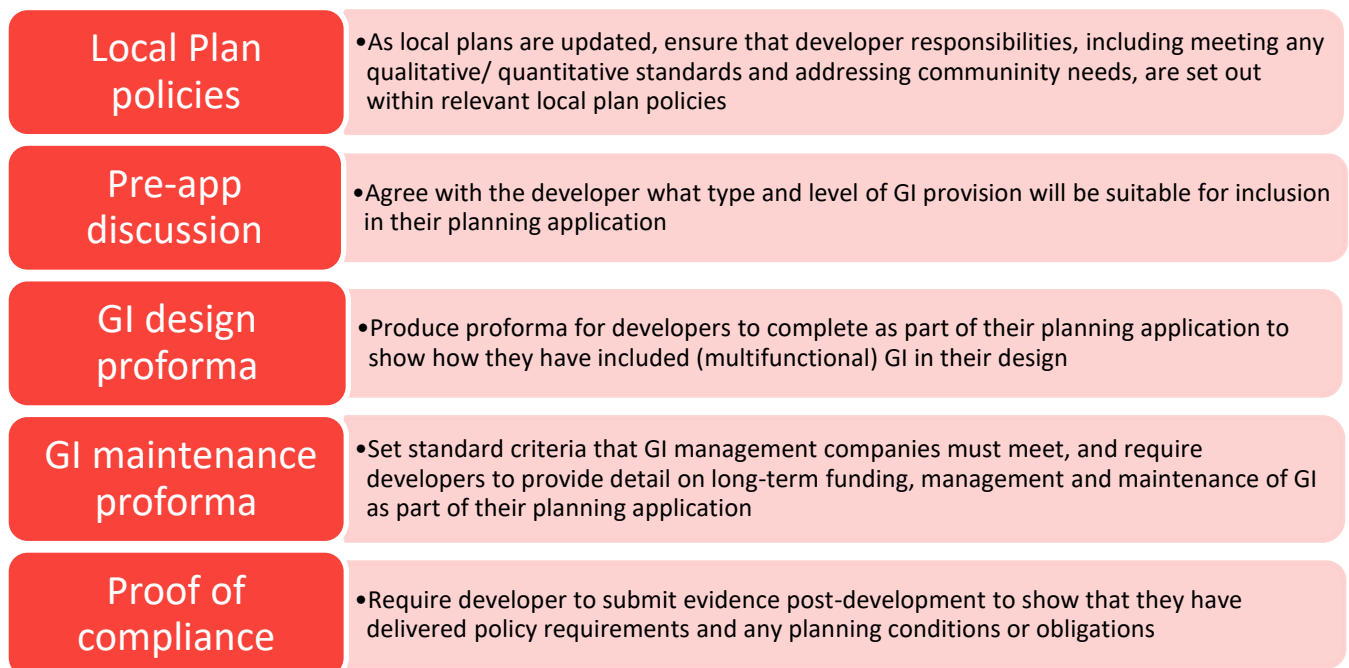


Figure 7: Proposed process for embedding green infrastructure principles in development management

Local plan policies will be important for setting out the requirements for developers to meet through their planning applications – particularly if numerical standards are to be imposed (see section 3.2 for information on possible standards). Teignbridge’s Development Framework Document includes an appendix on green infrastructure which sets out “detail and clarification on requirements for distribution and quality of green space secured through any planning application”, which may be of use – see Annex B (Figure 12) for further detail.

In order to reduce resource requirements on LAs, planning policy should place the onus on the developer to show upfront evidence of how they will meet identified community needs in the short and long term, and to submit evidence post-development to show that they have delivered these requirements (plus any planning conditions or obligations) as agreed. For example, developers could be provided with a proforma to complete to show that they have considered GI in the design process – an example of such a proforma (from Teignbridge District Council) is shown in Annex B (

Table 3). Manchester City Council also now asks for a Green and Blue Infrastructure Statement to be completed by developers as part of their planning applications.

Developers could be encouraged to use the spatial data available on the MappingGM website (available at <https://mappinggm.org.uk/gmodin/>) to show that their application will help to meet local community needs for ecosystem service provision (see section 3.1 for information on the maps available). With viability being a concern for any development, this spatial data can help to show developers why certain green infrastructure interventions are so valuable in particular locations, providing multiple benefits not only to the future residents (which may increase sales revenue), but also to the wider community (thus improving the chance of their application being approved). Developers should therefore be encouraged to design and manage for multifunctionality at the site-level, however the LA should recognise that not all sites can or should deliver the same set of functions.

It will also be important for LAs to seek assurances from developers that green infrastructure proposed through development will be deliverable and continue to be 'good' in perpetuity. Detail on long-term funding, management and maintenance should therefore be required from developers before applications can be approved. LAs are encouraged to set standard criteria that management companies must meet, to include evidence of experience, skills, financial security, and governance (especially if requiring input from the LA and/or future residents). In particular, developers should show that service charges to be imposed on future residents are realistic (neither too low or too high), and that any shortfall in funding (e.g. to cover renovations/upgrades) is met through a 'sinking fund' paid for upfront by the developer.

Depending on individual circumstances, planning conditions, obligations, S.106 agreements or the Community Infrastructure Levy (if applicable) may all be potential mechanisms for securing and funding green infrastructure through development.

In terms of outline versus reserved matters developments, it is important that LAs obtain sufficient detail from developers within outline applications to be sure that green infrastructure principles will be addressed. This should ensure that areas of existing and planned green infrastructure do not get consumed by the development, especially where large outlines are split up into smaller reserved matters. However, requirements for outline applications should also be sufficiently flexible to enable variation in the spatial arrangement of green infrastructure at reserved matters level.

Pre-applications typically require a fast turnaround, but the LA may feel they lack resource to do so. In this case, development managers should request further input from the applicant if the development is significant enough, and/or consult the planning strategy team or, where there are ecological interests, consult the GMEU.

2.5 MANAGEMENT AND MONITORING

Once created, green infrastructure will require sustainable management and maintenance if it is to provide ecosystem services and related benefits in the long term. Local community engagement can assist with support for changes and approaches, and enable tailoring of provision to local needs. If appropriate, LAs could consider encouraging community 'ownership' and stewardship of their local green infrastructure.

The GMCA is currently investigating a means of monitoring the quantity of green infrastructure types across the city region. This will take into account emerging proposals relating both to Biodiversity Net Gain and the implementation of the Greater Manchester Natural Capital Investment Plan.

Local level monitoring is also recommended – especially regarding the *quality* of green infrastructure, in addition to the quantity. Front-running LAs may wish to go further and monitor the provision of ecosystem service benefits (likely through proxy measures), though this is not required. Whatever monitoring is developed, this should be streamlined with existing data sources and/or practices as much as possible to reduce the requirement for additional resource, and improve efficiencies of data collection and analysis.



LAs should ensure that proposals for resourcing, managing, monitoring and maintaining green infrastructure (which may be developed according to local circumstances) are embedded within local plans and/or Green Infrastructure Strategies.

3 AVAILABLE GREEN INFRASTRUCTURE RESOURCES

Embedding national green infrastructure principles into planning functions across Greater Manchester is likely to lead to some additional resource implications for the LAs. However, these can be minimised by utilising the Greater Manchester green infrastructure evidence base (incorporating the spatial data described below); adopting tools (and possibly standards) of most relevance and interest to each LA; and working in partnership with the GMCA and the Greater Manchester Ecology unit (GMEU).

3.1 SPATIAL DATA

The planning of green infrastructure should be informed through use of the Greater Manchester green infrastructure evidence base; in particular the community environmental issues maps, and the ecosystem service opportunity maps. These should be supplemented with the use of local data, if available. The policy narrative supporting GMSF Policy GM-G 9 outlines the different types of maps available, and their purpose. How these maps should be used is shown in Figure 8.

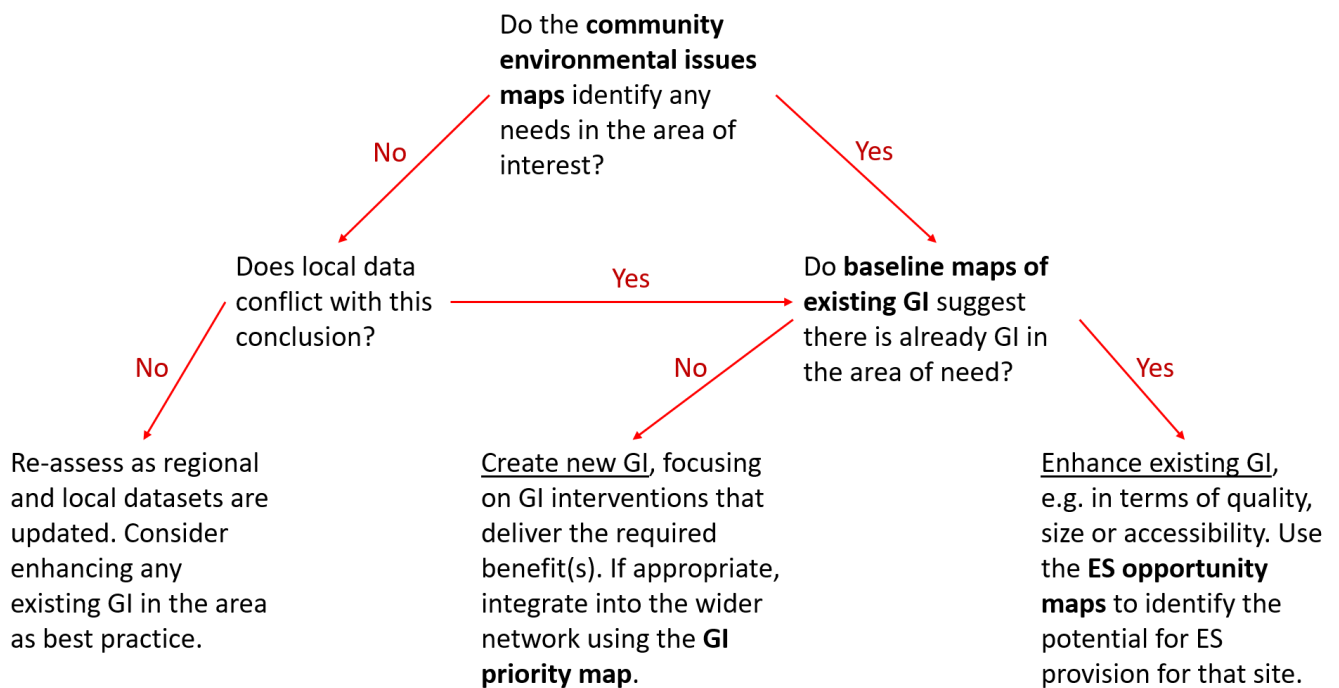


Figure 8: Using the Greater Manchester green infrastructure spatial evidence base

Additional information on the datasets is provided below, with a worked example shown in Figure 9 to help LA staff understand how to use these maps (available on the MappingGM website at <https://mappinggm.org.uk/gmodin/>) for a specific area of interest.

Community environmental issues maps

The community environmental issues maps should be used to identify areas that would benefit most from new or enhanced green infrastructure provision. The mapped datasets are focused on the needs of the local population and relate only to those which have the potential to be addressed through provision of good quality green infrastructure. The community environmental issues layers will be added to the MappingGM website.

The community environmental issues maps include the following ecosystem service benefits of green infrastructure:

- **Cooling / reducing heat:** The need for combatting vulnerability to heat stress has been identified using the University of Manchester's ASSCUE data. This identifies areas of the region likely to experience surface temperatures exceeding 29.7°C by 2050 (as NHS emergency response is deployed for temperatures above 30°C). The heat stress data has been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.
- **Decreasing surface water flood risk:** The need for a reduction in fluvial flood risk through green infrastructure has been identified using the Environment Agency's national Risk of Flooding from Surface Water data. The flood risk data has been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.
- **Air quality improvements:** The need for improvement of air quality through green infrastructure has been identified using Transport for Greater Manchester data on predicted nitrogen dioxide (NO₂) exceedances, and Defra's national data on modelled background concentrations for particulate matter (PM_{2.5}). These datasets have been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.
- **Aesthetic experience from natural greenness:** The need for the provision of areas of semi-natural green space has been identified using national Habitats of Principle Importance (HPI) data, and City of Trees tree canopy cover data. These datasets have been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.
- **Recreation opportunities from accessible greenspace within 300m of home:** The need for provision of accessible greenspace for the population has been identified using the Greater Manchester Accessible Natural Greenspace (ANGSt) dataset. It was decided to use only the data relating to areas deficient in the standard of 2ha of greenspace within 500m of home, as this better reflects local community need, and does not require residents to drive to the area of greenspace. The ANGSt data has been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.
- **Health and wellbeing (including access to nature):** The need for green spaces which can support mental and physical health is identified using the Health Deprivation and Disability domain from the national Index of Multiple Deprivation 2015 dataset. The deprivation data has been weighted by population data per Output Area to represent the areas in greatest need of new/enhanced green infrastructure.

The following ecosystem service benefits have not been mapped; the reason for this is specified for each, below:

- **Decreasing fluvial flood risk:** The need for a reduction in fluvial flood risk through green infrastructure has been identified using national Communities at Risk data, which already accounts for residential properties at risk of flooding, so does not need weighting by population data. However, for this ecosystem service, green infrastructure may need to be created or improved upstream or downstream of the affected areas, which cannot be accurately reflected with the available data.
- **Carbon sequestration:** The need for storing and sequestering carbon through green infrastructure is identified using the carbon sequestration data in the existing ecosystem services opportunity maps (see below). As such, this focuses more on carbon sequestration opportunities (i.e. identifying areas of peatland and plantable space) rather than issues.
- **Biodiversity and nature recovery:** The need for bigger, better, more and joined up spaces for wildlife is identified using the existing green infrastructure priority map (see below). As such, this focuses more on biodiversity opportunities (i.e. identifying areas for ecological enhancement) rather than issues.
- **Water quality:** The need for water quality to support wetlands and watercourse habitats is identified using the water quality data in the existing ecosystem services opportunity maps (see below). As such, this focuses more on water quality opportunities (i.e. identifying wetlands and watercourse habitats for enhancement) rather than issues.

Baseline maps of existing green infrastructure

Baseline maps should be used to identify whether there is already green infrastructure present within areas of identified community environmental issues. Baseline maps of existing green infrastructure across the city region

are held within the MappingGM website (see layer called OS Open Greenspace Sites). However, if available, LAs should use existing local data on green infrastructure assets (e.g. that obtained through Open Space Audits) in the first instance.

From 2021, MappingGM will contain additional data which is being created by the University of Manchester. The new data layers will identify the surface cover of different types of green infrastructure for each parcel of land across Greater Manchester. This new dataset will allow the GMCA and LAs to monitor progress against targets relating to increased green infrastructure provision.

Ecosystem services opportunity maps

If a community environmental issue is identified in an area with existing green infrastructure, then this green infrastructure should be enhanced (e.g. in terms of quality, size or accessibility). When enhancing an area of existing green infrastructure, the ecosystem services that could be provided/improved in that location (given its physical, social, economic, geographic and cultural characteristics) should be identified using the Greater Manchester ecosystem services opportunity maps available on the MappingGM website.

The ecosystem services opportunity maps may reveal other ecosystem services, additional to those highlighted through the community environmental issues mapping, that could be improved in that location. If the green infrastructure interventions chosen to address the area's community environmental issues can also deliver these additional ecosystem services for little or no additional cost, then the cost-benefit ratio of the scheme will become more favourable. With viability being a concern in any development, focusing on the multiple benefits of green infrastructure is recommended.

Green infrastructure priority map

If a community environmental issue is identified in an area with no existing green infrastructure, then new provision will be necessary. When planning the creation of new areas of green infrastructure, it may be appropriate to integrate these into the wider green infrastructure network, therefore supporting delivery of benefits to wider service provision (e.g. cycle ways or access to greenspace). This wider network is shown as the 'Greater Manchester green infrastructure priority map' (Figure 8.2) in the draft GMSF, and will be added to the MappingGM website. However, if available, LAs should use existing local data on green infrastructure priority locations (e.g. if set out in local plans and strategies) in the first instance.

The type of green infrastructure intervention to be implemented (whether in an area of existing green infrastructure or not) should directly depend on the local community environmental issue(s) to be addressed. A simple library of appropriate policy-relevant interventions for each of these issues is set out in Table 2 in the following section.

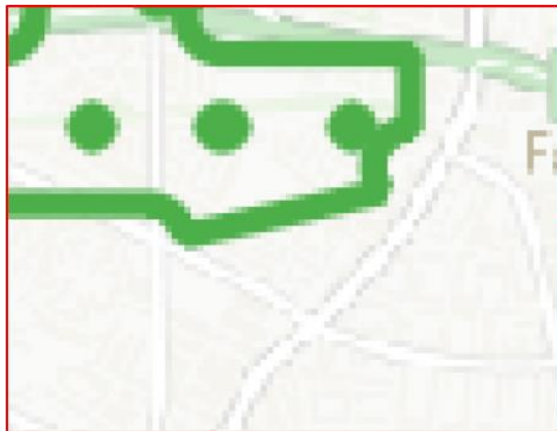
Zoom into area of interest



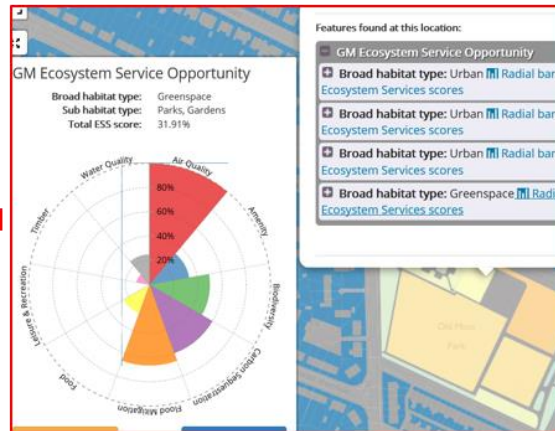
Identify need to reduce flooding



Identify existing green infrastructure



Link into priority GI network



Identify other ES opportunities



Identify flood reduction opportunity

Figure 9: Worked example of using the Greater Manchester green infrastructure spatial evidence base for a specific location



3.2 TOOLS AND STANDARDS

The national framework provides the necessary structure for the development, adoption and use of local standards and tools within Greater Manchester. These will enable changes in the delivery of benefits resulting from development and other land use change to be identified, assessed, and considered in decision making.

A wide range of tools are available (or currently being developed) for assessing the value of green infrastructure (described in Table 2 below). It is up to individual LAs which tools – if any – they apply. Green infrastructure assets are usually multifunctional, able to address multiple community environmental issues at once. If LAs wish to enhance provision of multiple ecosystem services in one area or site, then tools which are capable assessing a number of benefits – such as Eco-metric or the Natural Capital Planning Tool – may be especially useful.

However, given the particularly pressing need to improve health and wellbeing, reduce flooding, and increase biodiversity in various locations across Greater Manchester, the following tools (which each focus on just one of these community environmental issues) are recommended for use in the first instance:

- Accessible Natural Greenspace Standards (ANGSt)
- A Greater Manchester 'Green Factor'
- Biodiversity Net Gain (BNG) Metric
- Health Economic Assessment Tools (HEAT)

Table 2 below describes which tools are recommended, or available, for use for assessing the (estimated or potential) contribution of green infrastructure towards each of the prioritised community environmental issues. Further information on each of these tools – including their purpose, their data requirements (many tools rely on the same or similar data), and where to find more information online – is provided in Annex C.

Table 2: Appropriate interventions and tools for addressing identified community environmental issues

COMMUNITY ENVIRONMENTAL ISSUES	EXAMPLES OF APPROPRIATE GREEN INFRASTRUCTURE INTERVENTIONS	EXAMPLE TOOLS FOR ASSESSING DELIVERY OF BENEFITS FROM GREEN INFRASTRUCTURE INTERVENTIONS
Cooling/ Heat reduction	Areas of green space in built up areas, street trees, urban woodlands, green roofs.	<p>Optional tools:</p> <ul style="list-style-type: none"> - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together). - i-Tree Eco for quantifying the energy savings (regarding heating and air conditioning) that trees can provide through shading/sheltering buildings, and the monetary value of this. - Natural Capital Planning Tool for scoring development site-scale land use change impacts on a suite of ecosystem services (scores for individual ecosystem services may be added together). - Local Action Project (LAP) Toolbox for air temperature-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the building temperature benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
Decreasing surface water flood risk	Sustainable Drainage Systems (SuDS) that support wildlife, rain gardens, green roofs, trees and woodlands, permeable surfaces.	<p>Recommended tools:</p> <ul style="list-style-type: none"> - Green Factor for identifying the relative permeability of different land surfaces within a development site (scored from 0 to 1), and comparing to a numeric standard to be set by individual LAs and/or the GMCA. <p>Optional tools:</p> <ul style="list-style-type: none"> - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together).

		<ul style="list-style-type: none"> - i-Tree Eco for quantifying the litres of water that trees can divert from the sewer network, and the monetary value of this. - Natural Capital Planning Tool for scoring development site-scale land use change impacts on a suite of ecosystem services (scores for individual ecosystem services may be added together). - Building with Nature for identifying whether a development site meets specified qualitative standards (good or excellent) for water. - Local Action Project (LAP) Toolbox for pluvial flooding-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the rainwater harvesting and flooding benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
Decreasing fluvial flood risk	Decreasing flood risk from river flooding requires targeted intervention, normally up or down stream from the affected area.	<p>Optional tools:</p> <ul style="list-style-type: none"> - BEST for quantifying the waterbody flow and flood benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this. - Local Action Project (LAP) Toolbox for fluvial flooding-related cost-benefit assessment of green infrastructure interventions.
Air quality improvements	Creating cycle and walk ways away from traffic through green spaces. Inclusion of hedges and trees separating people from the traffic.	<p>Optional tools:</p> <ul style="list-style-type: none"> - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together). - i-Tree Eco for quantifying the tonnes of air pollutants that trees can remove from the air, and the monetary value of this. - Natural Capital Planning Tool for scoring development site-scale land use change impacts on a suite of ecosystem services (scores for individual ecosystem services may be added together). - Local Action Project (LAP) Toolbox for air quality-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the air quality benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.

<p>Aesthetic experience</p>	<p>Areas of high quality GI that can be experienced by everyone. This can include green walls, parks, wildlife habitats, lines of street trees.</p>	<p>Optional tools:</p> <ul style="list-style-type: none"> - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together). - CAVAT for putting a monetary value on the amenity benefit of individual trees. - Natural Capital Planning Tool for scoring development site-scale land use change impacts on a suite of ecosystem services (scores for individual ecosystem services may be added together). - Local Action Project (LAP) Toolbox for aesthetic-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the amenity benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
<p>Recreation</p>	<p>Areas of open access high quality GI, ideally more than 2ha in size. These could be parks, woodlands, nature reserves or (large) green roofs.</p>	<p>Optional tools:</p> <ul style="list-style-type: none"> - ANGSt for identifying access to natural greenspace, and comparing to a nationally recommended numeric standard. - Fields in Trust's Green Space Index for identifying provision of and access to recreational open space, and comparing to recommended numeric standards. - ORVaL for calculating the monetary value of recreational green spaces and to assess the impact of land-use change on this value. - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together). - BEST for quantifying the recreation benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
<p>Health and Wellbeing</p>	<p>All high-quality GI provision supports health and wellbeing. Areas can be created to:</p>	<p>Recommended tools:</p> <ul style="list-style-type: none"> - HEAT for estimating the monetary value of the health benefits of walking and cycling.

	<ul style="list-style-type: none"> - support walking, running and active commuting; - support community activity, such as gardening, habitat management or sport; or - provide quiet and safe sanctuaries. 	<ul style="list-style-type: none"> - ANGSt for identifying access to natural greenspace, and comparing to a nationally recommended numeric standard. <p>Optional tools:</p> <ul style="list-style-type: none"> - Building with Nature for identifying whether a development site meets specified qualitative standards (good or excellent) for wellbeing. - Local Action Project (LAP) Toolbox for undertaking access-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the health and wellbeing benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
Carbon sequestration	Restoration of areas containing peat soils, and tree and scrub planting.	<p>Optional tools:</p> <ul style="list-style-type: none"> - Eco-metric for scoring development site-scale land use change impacts on a suite of ecosystem services, following the use of the BNG Metric (scores for individual ecosystem services may NOT be added together). - i-Tree Eco for quantifying the tonnes of carbon that trees can sequester and store from the atmosphere, and the monetary value of this. - Woodland and peatland carbon codes for quantifying the carbon sequestered by tree planting or peatland restoration projects. - Local Action Project (LAP) Toolbox for carbon sequestration-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the carbon reduction and sequestration benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
Biodiversity/ Nature connections	Enhancement or creation of wildlife habitats as part of any GI provision, and especially when they contribute to the GI priority areas and nature recovery network.	<p>Recommended tools:</p> <ul style="list-style-type: none"> - BNG Metric for quantifying net gain in biodiversity on a development site (and comparing to a standard to be set by individual LAs and/or the GMCA). - ANGSt for identifying access to nearby nature, and comparing to a nationally recommended numeric standard.

		<p>Optional tools:</p> <ul style="list-style-type: none"> - Building with Nature for identifying whether a development site meets specified qualitative standards (good or excellent) for wildlife. - Local Action Project (LAP) Toolbox for habitat-related cost-benefit assessment of green infrastructure interventions. - BEST for quantifying the biodiversity and ecology benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this.
Water quality	Sustainable Drainage Systems (SuDS) that support wildlife, rain gardens, green roofs, trees and woodlands, permeable surfaces.	<p>Optional tools:</p> <ul style="list-style-type: none"> - BEST for quantifying the water quality benefits of sustainable drainage schemes (SuDS) over conventional piper drainage, and the monetary value of this. - Natural Capital Planning Tool for scoring development site-scale land use change impacts on a suite of ecosystem services (scores for individual ecosystem services may be added together). - Building with Nature for identifying whether a development site meets specified qualitative standards (good or excellent) for water. - Local Action Project (LAP) Toolbox for water quality-related cost-benefit assessment of green infrastructure interventions.

Some of the tools described in Table 2 above are associated with qualitative or numerical standards. These standards are set out below.

■ **Accessible Natural Greenspace Standards (ANGSt)**

This is a voluntary standard. In order to improve health, wellbeing and nature connections, Natural England recommends that everyone, wherever they live, should have:

- Accessible natural greenspace of at least 2 hectares in size within 300 metres of home;
- Accessible natural greenspace of at least 20 hectares in size within 2 kilometres of home;
- Accessible natural greenspace of at least 100 hectares in size within 5 kilometres of home;
- Accessible natural greenspace of at least 500 hectares in size within 10 kilometres of home;
- Provision of at least 1 ha LNR per 1000 population.

■ **A Greater Manchester 'Green Factor'**

There is currently no specific standard for reducing surface water flooding in Greater Manchester. However, the GMCA intends to develop one similar to that recently adopted in London. Policy G5 of the draft London Plan requires boroughs to develop an Urban Greening Factor to identify the appropriate amount of permeable surface cover required in new developments. On a scale of 0 (no permeability) to 1 (full permeability), a target score of 0.4 is recommended for developments that are predominately residential, and 0.3 for predominately commercial, though the scores may be tailored to local circumstances.

The Greater Manchester 'Green Factor' is expected to be similar to the London one, though it is likely that recommended scores will differ for rural and urban areas given the nature of the city region. Whilst LAs will be required to impose the Green Factor on new developments, following the approach of London, it is likely that target scores set by the GMCA will be variable at LA level so as to be appropriate to local circumstances.

■ **Biodiversity Net Gain (BNG) Metric**

As stated in the government response to the recent BNG consultation, the forthcoming Environment Bill will "require development to achieve a 10% net gain for biodiversity". This will therefore become a mandatory standard for all applicable developments (i.e. excluding permitted development and Nationally Significant Infrastructure Projects).

■ **Building with Nature**

This is a voluntary standard. If a development site meets a minimum number of the 23 specified qualitative standards, then the developer, or LA, may apply for 'Building with Nature Accreditation'. A successful application will be awarded either 'Building with Nature Good' or 'Building with Nature Excellent', depending on which standards have been met. There are five 'core' standards, and six standards for each of the thematic groups of 'wellbeing', 'water', and 'wildlife'. For example:

- CORE2: The scheme identifies important local character features as a starting point for the green infrastructure proposals and incorporates them into the scheme to reference, reflect and enhance the local environment.
- WELL4: The scheme supports local priorities for reducing and/or preventing health inequalities.
- WAT1: Green infrastructure is integral to sustainable drainage and features are designed to minimise surface runoff, manage flood risk, and maintain the natural water cycle.
- WILD3: Green infrastructure delivers key measures that contribute to the target conservation status of key species.

To be eligible for either level, an applicant must demonstrate that they have met all five core standards. For 'Building with Nature Good' an applicant must demonstrate they have met all nine 'Good' standards (standards 1-3 in each theme). For 'Building with Nature Excellent', an applicant must demonstrate they have met all nine 'Good' standards plus six out of nine 'Excellent' standards.

A worked example showing how the key tools and standards can be combined to provide multiple benefits on site is shown in Figure 10 below.

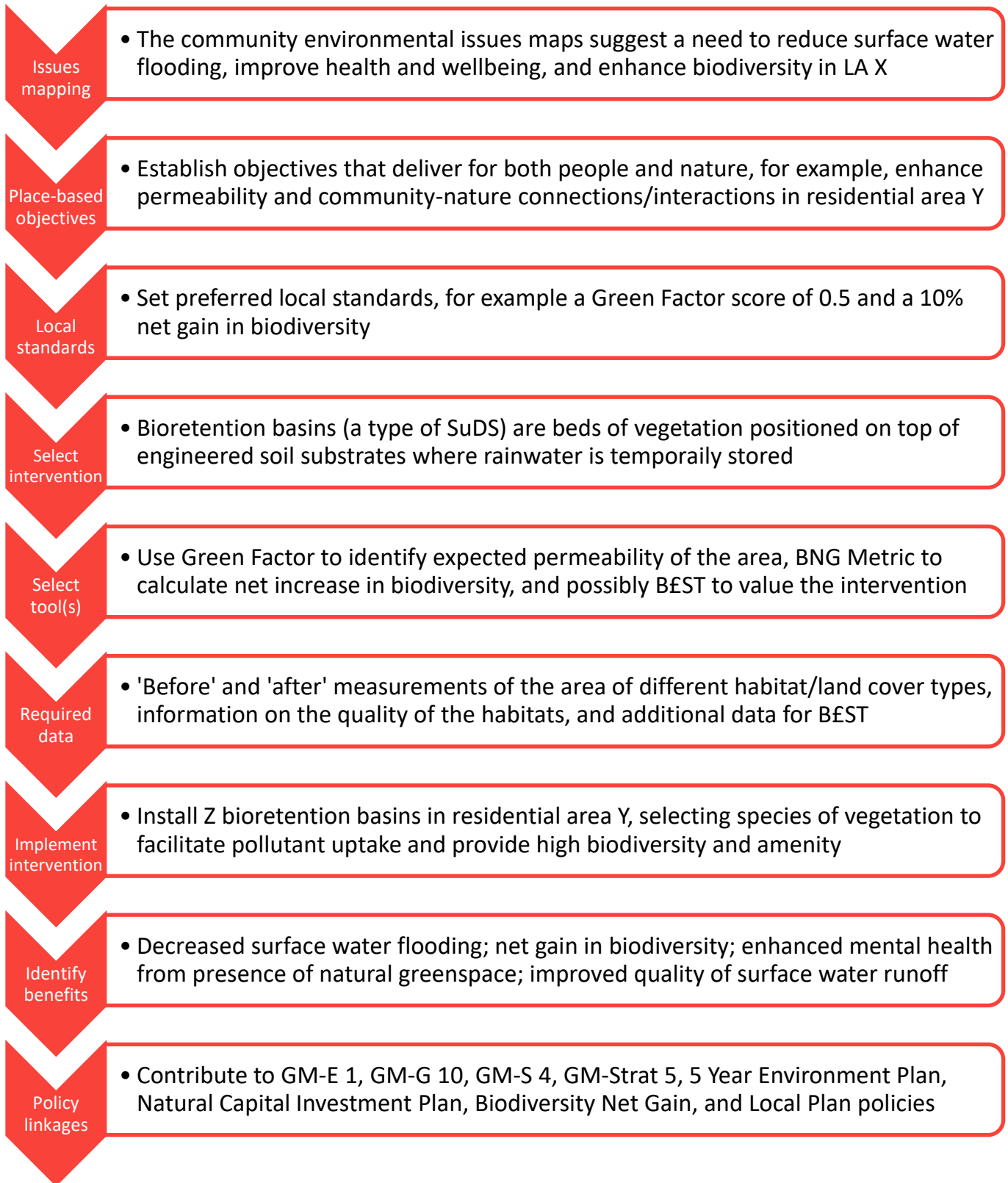


Figure 10: Worked example for using the tools and standards to improve multi-functionality on-site

In a situation where the community environmental issues maps identify no specific issues in an area, the LA may nevertheless wish to create or enhance green infrastructure to improve the overall greenness and value of the area – perhaps to encourage inward investment or tourism. In this situation, it should be noted that the application of numeric standards associated with ANGSt, the Green Factor, or BNG will result in different outcomes depending on the location of the site. For example, meeting the BNG standard will result in more/better green infrastructure than a Green Factor standard in rural locations (where achieving the permeability score will be easier), whereas the opposite will apply in urban locations (where achieving a net gain in biodiversity will be easier). Meanwhile, the ANGSt standards are likely to result in more accessible natural greenspace being created in rural than urban areas, but more Local Nature Reserves in urban than rural areas (due to the dispersed nature of the population in rural areas).

3.3 PARTNERSHIP WORKING

Where LAs lack inhouse expertise, it is recommended that LAs seek additional advice from the GMEU when undertaking an audit of their green infrastructure against the National Principles; developing local green infrastructure standards and interventions; or applying the Principles to planning policy, strategic allocations and development management. Note that the availability of advice will depend on the availability of the GMEU, whilst the completion of and responsibility for such tasks rests with the LA.

If Greater Manchester's LAs wish to develop more detailed Green Infrastructure Strategies, the NPPG recommends that LAs collaborate with neighbouring authorities and stakeholders such as Local Nature Partnerships, Health and Wellbeing Boards, and Local Enterprise Partnerships.

For green infrastructure delivered through development, good partnership working will be required between LAs, developers, green space management companies, and the residents and businesses who will be living and operating in these areas.

A partnership of such stakeholders is also important for supporting and monitoring the delivery of green infrastructure policies and strategies – particularly as it may bring in additional resources.

ANNEX A: EXAMPLES OF GREEN INFRASTRUCTURE IN GREATER MANCHESTER'S LOCAL PLANS

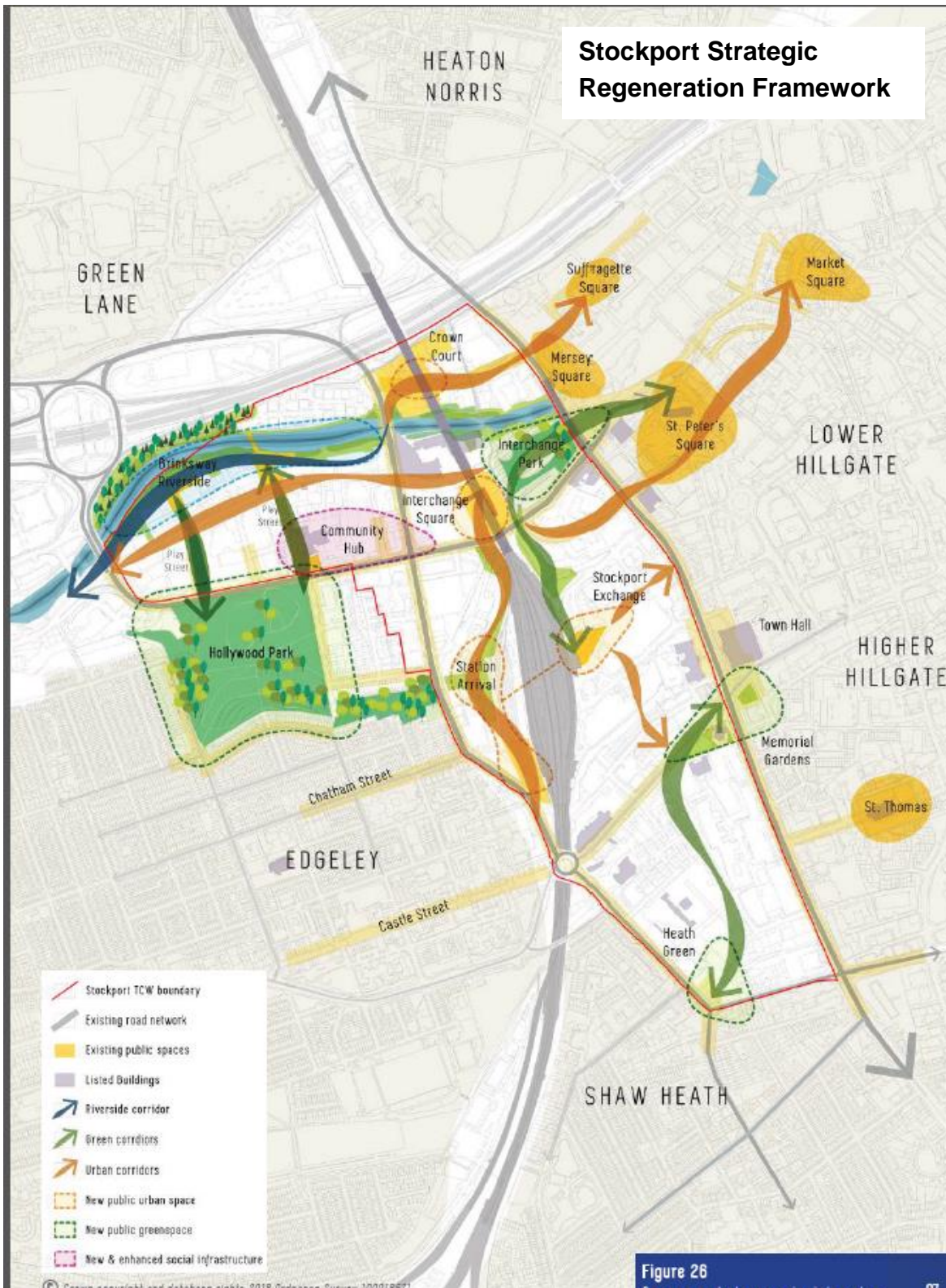
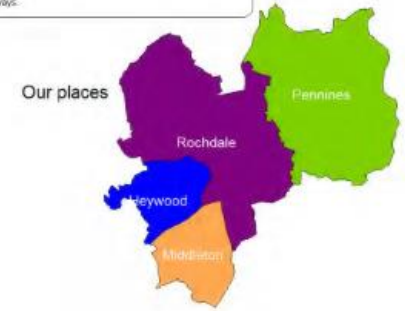
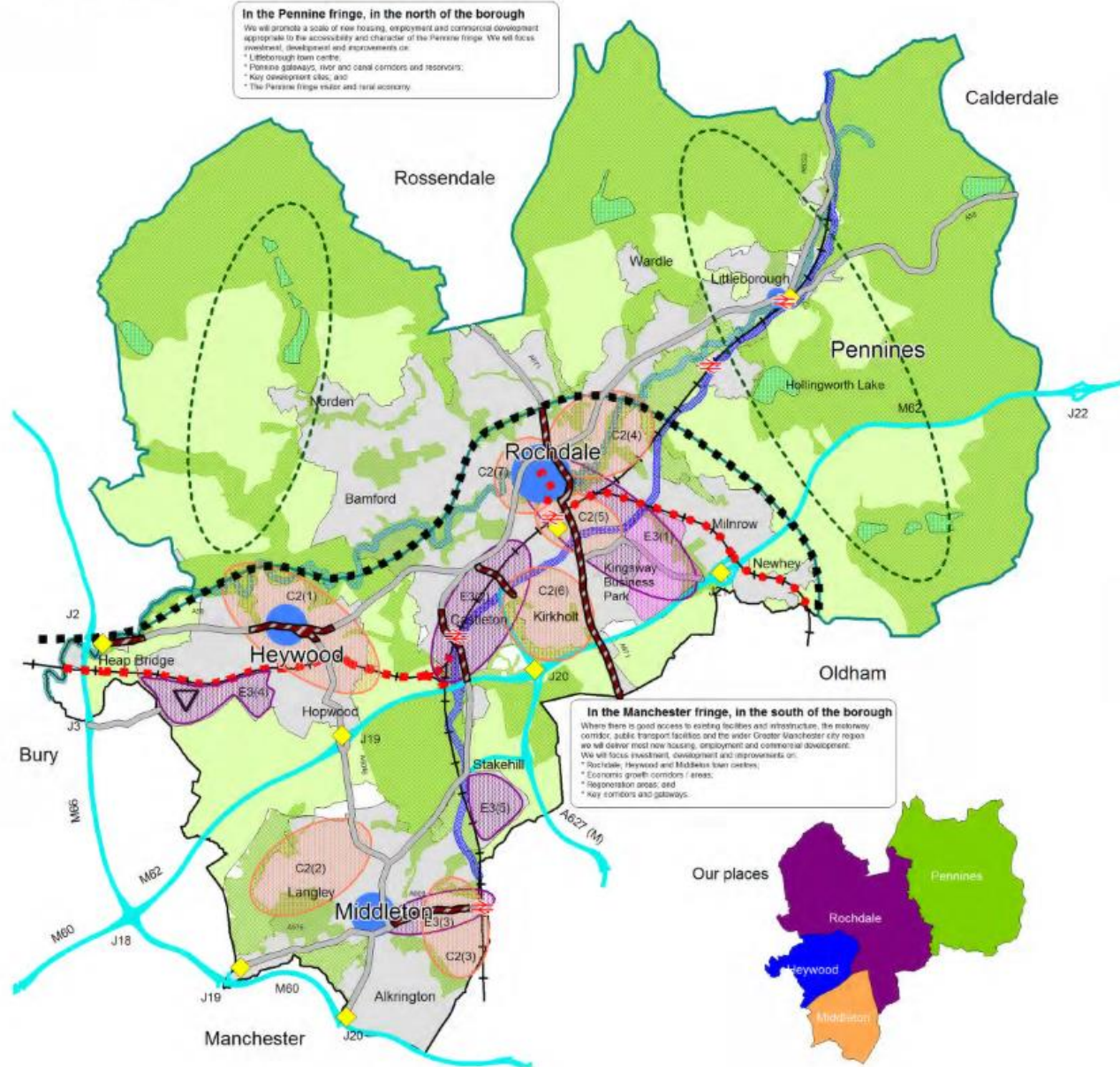


Figure 6 Spatial Strategy Key Diagram



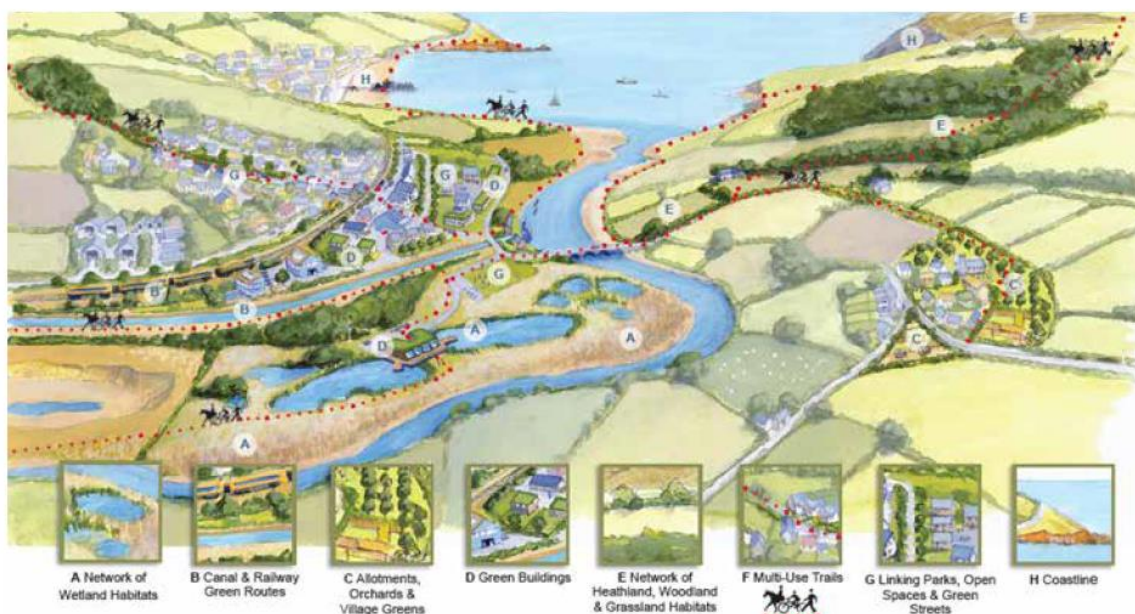
ANNEX B: EXAMPLES FROM TEIGNBRIDGE DISTRICT COUNCIL (STRATEGIC ALLOCATIONS & DEVELOPMENT MANAGEMENT)

Green Infrastructure (GI) is: a network of multifunctional green and blue spaces, both urban and rural, that create environmental and quality of life benefits for the community while providing habitats for wildlife.

Code: DG-GS2 (Green Infrastructure)

New development is to provide interconnected green, and where relevant, blue spaces that meet its needs and relate well and contribute to the wider network of green spaces within Teignbridge by:

1. Accounting and incorporating or delivering the principles and projects in the Teign Green Network - Green Infrastructure Strategy for Teignbridge
2. Responding to opportunities to enhance existing or create new GI assets and connections. This may be demonstrated in GI context plans and masterplans showing the proposed roles and connections in relation to the wider GI network.
3. Relating development proposals to GI features such that:
 - 3.1. There is sufficient space for the mix of functions within the proposed green spaces, supported by illustrative cross-sections
 - 3.2. Publicly accessible and interconnected pedestrian, cycle and vehicular networks are integral to proposals
 - 3.3. Necessary wildlife buffer zones and connections are allowed for and can be maintained
 - 3.4. Lighting levels are compatible with wildlife
 - 3.5. Buildings provide surveillance of public spaces and multifunctional corridors so they feel safe, are well elevated and provide a positive outlook to those spaces
 - 3.6. Property boundaries visible from public areas are durable for the lifetime of the development, attractive when implemented and likely to be maintained in an attractive and co-ordinated manner for the future
 - 3.7. Street and parking arrangements do not undermine function or appearance and are not wasteful of land.
 - 3.8. Landscape proposals are designed in a coordinated manner, are attractive and can be easily maintained





A well integrated GI Network - functioning for wildlife and people

- | | | |
|------------------------------|---|--|
| 1 Play areas and leisure | 5 Interconnected street network | 8 Wildlife commuting and foraging routes |
| 2 Water management | 6 Outward facing block structures | |
| 3 Food production | 7 Existing habitats retained and enhanced | |
| 4 Safe footpath/cycle routes | | |

Plan positively for the design of GI by including strategies or proposals for the following where relevant to the envisaged development:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Retained features • Access for all and movement • Boundary treatments • Utilities • Hard and soft landscape materials • Surface and path treatments • Furniture (incl seating, bollards, bins, cyclestands, structures and shelters etc.) • Signage, nameplates and banners • Water features and drainage design | <ul style="list-style-type: none"> • Public art • Play and sports facilities • Trees • Lighting and surveillance • Relationship between buildings and green spaces • Public events, users and activities • Ownership • Monitoring, management and maintenance |
|--|---|

Many Teignbridge GI constraints and opportunities can be found on the council's web site.

Figure 11: GI design guide to inform strategic allocations and planning applications

Available at <https://www.teignbridge.gov.uk/media/6362/teignbridge-design-guide-5-green-structures-220118.pdf>

Introduction

This appendix provides further detail and clarification on requirements for distribution and quality of green space secured through any planning application. The following table summarises the quantum and different typologies of green space required based on a 1,150 dwelling allocation:

Type of Space	Quantity (m ² per dwelling)	Open Space Requirement (m ²)	Open Space Requirement (ha)
Children and young people's space	10	11,500	1.15
Formal and informal green space (Park Space)	17	19,550	1.95
Allotments	6	6,900	0.69
Natural green space	50	57,500	5.75
Active recreation space (Outdoor sports pitches)	27	31,050	3.11
Total	110	126,500	12.65

Planning

Green space will be secured through the planning application process, conditions and section 106 agreements. Where the comprehensive approach supports a deficit in delivery of a particular element of GI on an application site, contributions will be required for additional provision elsewhere.

As part of any full planning application or prior to first reserved matters, a Green Infrastructure Vision Statement must be agreed to support and guide the final design. It shall set out the aims and objectives, key design characteristics and location and layout for proposed green infrastructure features and how this contributes toward the wider strategy for the site. The statement should address formal/informal, active and natural green space, play space and SUDS. This would be supported by individual implementation plans at the reserved matters/detailed design stage.

Figure 12: Requirements for distribution and quality of green space secured through planning applications

Available at <https://www.teignbridge.gov.uk/media/7008/na1-development-framework-document-june-2018-web.pdf> (see Appendix F)

Table 3: A green infrastructure statement proforma for completion by developers, used to explain how they have considered green infrastructure and ecosystem service provision in the design process

	ROLES AND BENEFITS	EXPLAIN
Environmental	<p>Biodiversity</p> <ul style="list-style-type: none"> - Increased abundance and diversity <p>Landscape</p> <ul style="list-style-type: none"> - Strengthen character and quality <p>Townscape</p> <ul style="list-style-type: none"> - Improved attractiveness and sense of place 	
Climate change	<p>Flood Risk & Water Resource</p> <ul style="list-style-type: none"> - Improved flood management, water quality and storage <p>Renewables</p> <ul style="list-style-type: none"> - Source(s) of renewable energy <p>Local Food</p> <ul style="list-style-type: none"> - Increased production of local foodstuffs <p>Sustainable Transport</p> <ul style="list-style-type: none"> - Improved provision for walkers, cyclists and public transport users, including better connectivity and integration <p>Waste Management</p> <ul style="list-style-type: none"> - High levels of on-site composting <p>Heat Islands</p> <ul style="list-style-type: none"> - Moderation of microclimates 	

<p>Wellbeing</p>	<p>Health</p> <ul style="list-style-type: none"> - Improved mental and physical health <p>Air Quality</p> <ul style="list-style-type: none"> - Improved air quality <p>Crime</p> <ul style="list-style-type: none"> - Natural surveillance to reduce the level and fear of crime <p>Communities</p> <ul style="list-style-type: none"> - Creation of strong, vibrant and inclusive communities with 'civic pride' <p>Culture</p> <ul style="list-style-type: none"> - Improved connections with the past and creation of assets for the future <p>Learning</p> <ul style="list-style-type: none"> - Enhanced opportunities for study and education 	
<p>Regeneration</p>	<p>Thriving Economy</p> <ul style="list-style-type: none"> - Improved environmental quality and connectivity of employment areas <p>Productive Landscapes</p> <ul style="list-style-type: none"> - Harness the potential of our natural resources in balance with environmental limits <p>Tourism</p> <ul style="list-style-type: none"> - Improved and extended tourism offer 	

ANNEX C: LIST OF STANDARDS AND TOOLS

Accessible Natural Greenspace Standards (ANGSt)

This seeks to maximise the overall proportion of people across Greater Manchester who have access to natural green space. Published by Natural England, ANGSt is a helpful starting point for informing green infrastructure policy and site allocations, as its focus on ensuring good accessibility to different sizes of green space for all residents make it an appropriate approach at a sub-regional level. ANGSt analysis has been carried out across Greater Manchester for individual LAs and Lower Super Output Areas – this data should be used in the first instance. More detailed standards regarding specific habitats, designations, quality or functions of green space may be set out in district local plans, taking account of local circumstances and opportunities. (For more information on the tool see http://www.ukmaburbanforum.co.uk/documents/other/nature_nearby.pdf).

A Greater Manchester ‘Green Factor’

Once developed by the GMCA, this will set out the level of on-site green infrastructure that new developments are expected to provide, so as to meet their occupants’ needs, increase ecosystem service delivery, and contribute to the extent and interconnectedness of the wider network. The Green Factor will provide a baseline expectation based on the proportion of the site that is covered by different types of green infrastructure features (each with their own ‘factor’ or ‘score’). Similar to the ‘Urban Greening Factor’ adopted in the London Local Plan, the Green Factor will be based on a set of regional factors, but tailored to local circumstances. (For more information on the tool see <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/draft-new-london-plan/chapter-8-green-infrastructure-and-natural-environment/policy-g5>).

Biodiversity Net Gain (BNG) Metric

This is an approach that aims to leave biodiversity in a better state at the end of the development than at the beginning by avoiding, minimising and compensating for impacts. The approach uses a metric, developed by Defra, to value biodiversity before and after the development. The BNG metric requires data collected from a site visit for a habitat classification survey and an additional condition assessment survey to determine the habitat’s type and condition. An updated version of the tool is currently in development. Within Greater Manchester, specific guidance has been produced to support developments to deliver BNG, whilst UK-wide guidance is also available from CIEEM/IEMA/CIRIA. The Government has also recently issued a response to the Defra net gain consultation. (For more information on the tool see <http://nepubprod.appspot.com/publication/5850908674228224>).

Health Economic Assessment Tools (HEAT)

This tool is designed to enable users to conduct economic assessments of the health impacts of walking or cycling. Developed by the World Health Organisation, HEAT estimates the value of reduced mortality that results from specified amounts of walking or cycling, and can provide evaluation of new or existing projects, including benefit-cost ratio calculations. The user is required to input data relating to the volumes of travel (i.e. duration, distance, frequency, trips), purpose of travel (i.e. transport or recreation) and population size. Alternative tools which encourage health and wellbeing outcomes may also be used. (For more information on the tool see <https://www.heatwalkingcycling.org/#homepage>).

Fields in Trust’s Green Space Index

The Green Space Index (GSI) covers Great Britain and analyses publicly accessible local park and green space provision as mapped by Ordnance Survey. It is a freely available tool which includes map layers which are updated on an annual basis. The Green Space Index does not include regional park and green space land, such as national parks and common land, or other aspects of green infrastructure such as canal towpaths and grass verges. All of the data is included within the map tool and comprises the following: (1) Fields in Trust’s unique GSI Score, where a score of 1 indicates a minimum standard of provision; (2) The total provision of parks and green spaces; (3) The provision per person; (4) The number of people who are not within a ten-minute walk of a park or green space. (For more information on the tool see <http://www.fieldsintrust.org/green-space-index>).

Natural Capital Planning Tool

This is an excel-based tool that calculates a development impact score for multiple ecosystem services, indicating the direction and magnitude of the impact on each service as well as all services combined into one overall score. It is therefore a good tool for a rapid, initial assessment of development site-scale land use change impacts on ecosystem services, and whether the mix of habitats provides no net loss or net gain for natural capital. All the data required by the NCPT is easily and freely accessible online or is usually available as part of the planning process. (For more information on the tool see <http://www.ncptool.com/>).

Building with Nature Standards

Building with Nature is a voluntary approach that enables developers, who want to go beyond the statutory minima, to create places that really deliver for people and wildlife. It brings together guidance and good practice to recognise high quality green infrastructure at all stages of the development process including policy, planning, design, delivery, and long-term management and maintenance. The standards therefore enable nature-friendly features to be integrated throughout the development. The framework of standards is divided into four themes: core, wellbeing, water and wildlife. The standards are free to use and can assist with the planning and development of new places and communities. (For more information on the tool see <https://www.buildingwithnature.org.uk/about>).

Eco-metric

Natural England's Eco-metric tool is being developed to help users to assess the impacts of land-use change on the delivery of ecosystem services, and has been trialled in Greater Manchester. The Eco-metric approach is an add-on to the Defra biodiversity metric. Delivering net gain in biodiversity will remain the primary aim, but once this has been assured the Eco-metric can then be used as a supplementary tool to explore opportunities to deliver wider natural capital benefits and minimise any negative impacts. The approach is based on a scoring matrix which assigns scores (on a scale of 0-10) for the ability of different types of land cover to deliver 18 different ecosystem services and multiplies these scores by the area of habitats before and after the planned land-use change. The Eco-metric can be applied at Basic, Standard and Advanced levels depending on the amount of data available. For the Basic assessment all information can be looked up from freely available online sources such as Defra's MAGIC website, but for the Standard and Advanced assessments some data needs to be collected via a site survey. Field data collection for the Eco-metric could be integrated within the procedure for a Phase 1 habitat survey. This tool is expected to be published in spring 2020. (For more information on the tool see <https://ecosystemsknowledge.net/ecometric>).

I-Tree Eco

I-Tree Eco is a software-based tool that combines locally collected field data with integrated environmental data to model multiple ecosystem services provided by trees. Designed for assessing the value of 'forest' in an urban setting. It allows users to estimate the quantity and economic value of multiple ecosystem services that forests/trees provide for the community. In addition to avoided surface water runoff and carbon storage of trees, the tool calculates the effects that trees have on building energy use and related reductions in carbon dioxide emissions and the urban heat island. However, it does not incorporate any cultural values for trees. I-Tree Eco requires field-based data collection on individual trees. A wide range of data can be gathered to run the assessment including but not limited to the signs and symptoms of tree stress, crown size and land use type in which the tree is located. However, the minimum required fields to run an I-Tree Eco assessment are the tree species and the tree stem diameter at breast height for each tree. (For more information on the tool see <https://www.itreetools.org/tools/i-tree-eco>).

ORVal

ORVal is an online mapping tool which uses national data combined with econometric modelling to produce an economic value for any recreational space in England and Wales. It is designed to quantify the recreational value of green space and to assess the impact of land-use change on this value. It could be useful for identifying

locations for new greenspace that would have high welfare value based on people visiting those sites for recreational purposes and determining whether new routes (such as cycleways, paths, public rights of way) are likely to be used by people. All input data is provided internally by the tool. The user only needs to choose an existing green space by clicking on the map and specify the land cover of altered or newly created green space. (For more information on the tool see <https://www.leep.exeter.ac.uk/orval/>).

BEST

BEST is an excel-based tool that uses ecosystem services to understand the overall benefits that Sustainable Urban Drainage Systems (SuDS) provide over conventional piped drainage, and estimates the economic value of the benefits. The main purpose of the tool is to help practitioners estimate the impacts and benefits of SuDS when considering them as an alternative to conventional drainage solutions. A wide range of data and information may be needed to complete a benefit assessment. This may include for example hydraulic modelling, flood risk assessment, environmental and health impact assessments, population and socio-economic data. This may require the input from a range of professionals, including ecologists, economists, engineers, architects, landscape architects, master planners or flood risk managers. (For more information on the tool see <https://www.susdrain.org/resources/best.html>)

CAVAT

CAVAT is an excel-based tool that considers structural aspects of trees along with an estimate of amenity value to calculate an economic value based on their replacement cost. It can also be used to determine the value of a population of trees as an asset. It considers aspects of the cultural value of trees associated with their amenity value but does not address other benefits provided by trees such as flood protection, biodiversity, improved air quality or climate change resilience. It is only relevant for amenity trees, not habitats or green spaces in general. The minimum data required to run the Quick Method of the CAVAT assessment is the tree's value band (derived from trunk diameter), the functional status and the asset value. However, for a more comprehensive assessment additional data must be collected on site. (For more information on the tool see <https://www.ltoa.org.uk/documents-1/capital-asset-value-for-amenity-trees-cavat>).

Woodland and peatland carbon codes

The UK Woodland Code sets out design and management requirements for voluntary UK based projects that aim to sequester carbon through woodland creation. It uses a spreadsheet calculator tool to determine the amount of carbon sequestered by woodland planting. It requires limited data input which includes the tree species, spacing of the trees, yield class and management. These values are inputted within a dropdown menu selection. IUCN are developing a UK Peatland Code which accounts for the reduction in emissions when restoring areas of degraded peatland. This standard is developed along similar lines to the UK Woodland Carbon Code. (For more information on the tools see <https://www.woodlandcarboncode.org.uk/about> and <https://www.iucn-uk-peatlandprogramme.org/funding-finance/peatland-code>).

Local Action Project (LAP) Toolbox

Defra's Local Action Project aimed to work with local communities to enhance the value of natural capital in towns, cities and other urban spaces to improve people's lives, the environment and economic prosperity. The LAP produced the following outputs:

- Method for assessing opportunities to enhance or create new ecosystem services in urban areas;
- Toolbox of interventions to enhance/increase ecosystem services provision in urban areas;
- Cost-benefit assessment of the benefits and impacts of those interventions;
- Series of case studies piloting the mapping and cost-benefit tools, plus lessons learnt report;
- Suite of communication & visualisation tools and a database of good practice examples.

The LAP toolbox can provide an overview of the benefits of different urban interventions, further literature and examples of where an intervention has been used. It can also inform decisions about the right way to intervene in

the local environment. The benefits wheel shows the relative contribution a certain type of intervention can make to a specific characteristic of an area. It identifies 12 different benefits, grouped into four categories – social, environmental, economic and cultural – that influence the quality of life. The LAP has already successfully been applied in Manchester City and could be replicated at a regional scale. The data required is all freely accessible and available online. (For more information on the tool see <http://urbanwater-eco.services/project/local-action-toolkit/>).

IUCN Global Standard for Nature-based Solutions

The IUCN standard for nature-based solutions (NbS) comprises general principles rather than numeric targets. For example, 'NbS conserve, restore and sustainably use ecosystems to address societal challenges' and 'NbS seek synergies with other types of interventions where necessary to meet societal needs'. Currently, there is no specific information online about the data which will be required to use the tool. The standard and associated verification tool are expected to be launched in 2020. (For more information on the tool see <https://www.iucn.org/theme/ecosystem-management/about/our-work/a-global-standard-nature-based-solutions>)