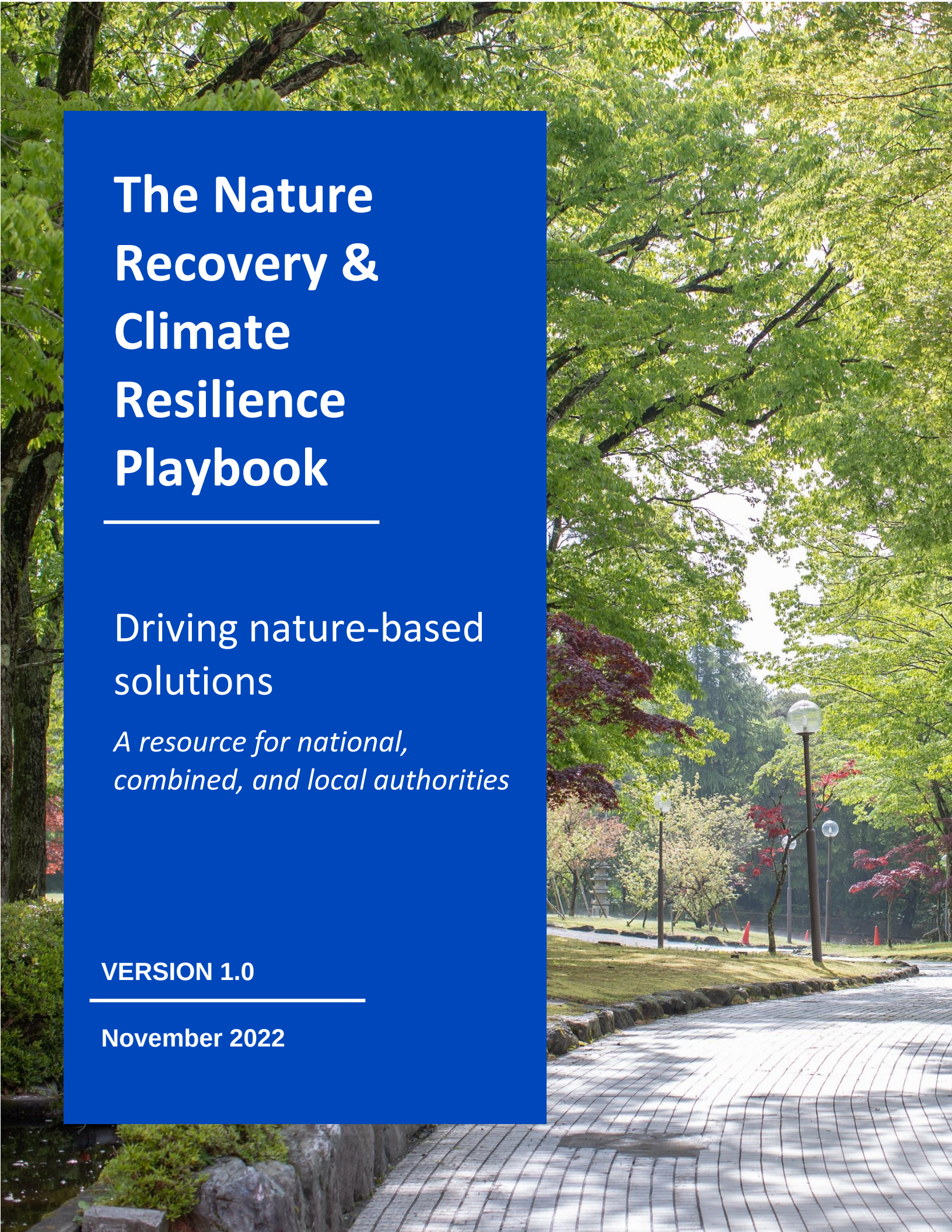

The Nature Recovery & Climate Resilience Playbook

Driving nature-based solutions

A resource for national, combined, and local authorities

VERSION 1.0

November 2022

Programme Partners:

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Dedicated to the memory of Peter Box

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Introduction

The Nature Recovery and Climate Resilience Playbook

Introduction

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i. Purpose

This resource has been designed to help local, combined, and national authorities enhance the sustainability of new and existing developments. It aims to support both biodiversity recovery and climate resilience using nature-based solutions, promoting a consistent, user-friendly approach to sharing best practice.

It will enable authorities to benefit from shared learning, common resources, and mutual confidence, whilst also providing stability for industry around the requirements expected from it across different parts of the country.

The Playbook is designed to be used and adapted to support the 'day job' of officers as well as elected members with responsibility for sustainability, planning, regeneration, and other areas within different authorities. It may be used in the following ways (and more).

- To inform planning policy in relation to the sustainability of new development
- To inform sustainability requirements as a procurer
- To support local strategy development and target setting
- To enable positive engagement with developers who want to support an authority's aspirations
- To signpost to policy precedents, industry standards, useful initiatives, case studies and other helpful resources

ii. Using and contributing to this resource

This resource is intended to be a live document that reflects the evolving policy context and is 'co-owned' by users and the wider professional community.

Because of this, we are actively seeking ongoing feedback and engagement. The Playbook is primarily a guide; we have created a resource that users can 'dip into' and read relevant sections in line with their capacity/progress, etc.

Recommended actions for those in government authorities

- Consider how and when the recommendations can be incorporated into policy and associated guidance, and provide us with your feedback.
- Open up or maintain dialogue with UKGBC on the status of your current policy and future plans.

Recommended actions for built environment professionals

- Consider the implications of the policy recommendations for your projects and business model.
- Positively engage with UKGBC through membership to develop further iterations of policy proposals.

iii. Background

Our climate is changing, and the negative impacts on our buildings, physical infrastructure and way of life are set to increase. The IPCC Special Report Global Warming of 1.5ºC found that we are already seeing the consequences of a 1ºC global temperature rise, and that a rise of 1.5ºC is expected by 2030-2052.[1]

UK Climate Projections show that the UK will see hotter, drier summers, and wetter, windier winters. These conditions represent a significant risk to the UK built environment as it is not sufficiently prepared. Of the eight priority climate risk areas identified by the Climate Change Committee that should be tackled in the next two years, the risks to human health, wellbeing, and productivity from increased exposure to heat in homes and other buildings (risk 5) were identified as amongst the most urgent to address and most severe, alongside wider impacts of drought and flooding.

We are also in the midst of an ecological crisis. According to the landmark State of Nature report, over 58% of monitored species have declined significantly in the UK between 1970 and 2019, and 15% are at risk of extinction.[2] Land use change, including the loss and fragmentation of key habitats, has been identified as a key driver of this decline, with urban areas having more than doubled since 1992.

Through measures to promote the effective use of nature-based solutions in the built environment, national, local and combined authorities can help address both crises. If used and designed correctly, nature-based solutions can deliver a wide array of mutual benefits across all geo-spatial levels of local policy, enhancing both local resilience to the impacts of climate change and biodiversity recovery, whilst positively contributing to our health and wellbeing.

iv. Policy context

This section of the playbook outlines the relevant legal and policy frameworks for the UK, highlighting the key laws, international commitments and national policies that will affect local planning authorities. These can also serve as important evidence for planners to push for more ambitious action in their areas.

International

UN Convention on Biological Diversity (CBD)
The UK is a signatory to the United Nations Convention on Biological Diversity (CBD) – a multilateral treaty which calls for the development and enforcement of national strategies and associated action plans. It aims to identify, conserve, and protect existing biodiversity, enhancing it wherever possible.

[1] https://www.ipcc.ch/sr15/
[2] https://nbn.org.uk/stateofnature2019/reports/

The original UK Biodiversity Action Plan (UK BAP) was published in 1994 and included plans for the most threatened species and habitats, with national progress reports published every three- to five-years. The UK's 6th National Report to the CBD was published in 2019.

Following devolution, the constituent nations of the UK developed their own strategies. In 2007, a shared vision for UK biodiversity conservation – 'Conserving Biodiversity – the UK Approach' – was developed to support cooperation and incorporate new drivers for action, including the EU Gothenburg agreement in 2001 which aimed to halt the loss of biodiversity by 2010, and the findings of the Millennium Ecosystem Assessment (2005). At the local level in the UK, Local Biodiversity Action Plans (LBAPs) were produced to translate national priorities and targets into action (*see section 1*).

Aichi Biodiversity Targets

In October 2010, a revised global Strategic Plan for Biodiversity 2011-2020 was agreed, which included the 20 Aichi Biodiversity Targets. The **'UK Post-2010 Biodiversity Framework'** was developed to replace the previous strategies, and integrate work across the UK to achieve the 'Aichi Targets' and the aims of the EU Biodiversity Strategy (EUBS). The latest UK Biodiversity Indicators 2021 report was published in 2021, and progress across many of the indicators is still inadequate.[3] A new set of global biodiversity targets is currently being negotiated. To allow for a review of these new indicators, there will be a pause in UK indicator publication in 2022, with the next update scheduled for 2023.

COP 15

In October 2021, over 100 nations, including the UK, signed the Kunming declaration on biodiversity, which included the goal to protect thirty percent of natural land and sea habitats by 2030. The Kunming declaration is not a binding international agreement but instead sculpts a path to recovery by highlighting the key challenges facing biodiversity. COP 15 is to be held from December 7th–19th in Montreal, Canada with the hope of setting new goals for nature for the next decade using the post-2020 framework.

UN Sustainable Development Goals (SDGs)

The SDGs are a collection of 17 interlinked global goals designed as a development framework to succeed the Millennium Development Goals, which ended in 2015. The SDGs are intended to be achieved by 2030. Each goal typically has 8–12 targets, with between 1 and 4 indicators used to measure progress. SDG 15 aims to: '*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'.*

States are required to produce at least one *Voluntary National Review* – a report in which they assess and present progress they have made towards achieving the SDGs. In 2019, the UK produced its first Voluntary National Review.

[3] https://community.rspb.org.uk/ourwork/b/science/posts/the-latest-uk-and-england-biodiversity-indicators

UK Policy Context

UK Post-2010 Biodiversity Framework

The first national Implementation Plan for the 'UK Post-2010 Biodiversity Framework' included milestones agreed for 23 key areas identified in the Framework and related reporting. Two progress reports were produced in December 2013 and October 2015.

An updated Plan was produced in 2018, as many of the original goals were due to be completed in 2015. Since there have been significant policy changes at both a devolved – and UK – level, it was agreed by the Four Countries' Biodiversity Group that, for the remainder of the life of the Framework (until 2020), the Plan would be simplified to focus on high-priority activities and reduce unnecessary reporting. The UK Biodiversity Framework will be refreshed to align with a Post-2020 Global Biodiversity Framework, once Parties agree to adopt such a Framework.

The Joint Nature Conservation Committee (JNCC)

The JNCC is the statutory adviser to the government and devolved administrations on UK and international nature conservation. The JNCC is led by a Joint Committee including the nature conservation bodies for the Four Nations and independent members appointed by the Secretary of State, under an independent chair.

Wildlife and Countryside Act 1981

The Wildlife and Countryside Act gives protection to native species of birds, plants and animals; controls the release of non-native species; enhances the protection of *Sites of Special Scientific Interest,* and protects public rights of way. The Wildlife and Natural Environment (Scotland) Act 2011 made some major amendments with regard to the control of non-native species, the protection of birds, the protection of hares and rabbits, and associated poaching. It includes provisions for monitoring the environment by national agencies, law enforcement and regulatory bodies.

UK Climate Adaptation programme & Climate Change Act 2008

The National Adaptation Programme (NAP) sets out the actions that the UK Government will take to adapt to climate change in response to the Climate Change Risk Assessment (CCRA). A five-yearly report cycle forms part of the requirements of the Climate Change Act 2008, setting out key actions to be taken over each five-year period.

The second national adaptation programme sets out government's response to the second Climate Change Risk Assessment (CCRA) covering 2018 to 2023. Additionally, the Act provides Government with the 'Adaptation Reporting Power' to require public bodies and infrastructure operators that provide key services, to report on actions they are taking to address climate impacts. The third adaptation programme, and next UK strategy (2023 - 2028), are currently under development.

UK Climate Risk Assessment

The Climate Change Act 2008 includes a requirement to complete a Climate Change Risk Assessment (CCRA) every five years, with the National Adaptation Programme required to set out how the risks will be addressed. The Adaptation Sub-Committee (ASC) of the Climate Change Committee are the Government's independent, statutory advisers on climate adaptation, and produce a report to fulfil the requirement for the Government to lay a five-yearly assessment before Parliament. The third UK Climate Risk Independent Assessment (CCRA3) was published in June 2021.

Conservation of Habitats and Species Regulations
Conservation of Habitats and Species Regulations includes measures for safeguarding species, habitats and protected sites. Regulation 9 of the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations), sets out duties for relevant public authorities to exercise their nature conservation functions in compliance with or with regard to the requirements of the Habitats Directive and the Wild Birds Directives (the Directives). A competent authority must carry out an assessment under the Habitats Regulations, known as a habitats regulations assessment (HRA), to test if a plan or project proposal could significantly harm the designated features of a European site.

Advice from the relevant Statutory Nature Conservation Body (SNCB), (e.g., Natural England) helps competent authorities such as local councils determine whether a plan or project on its own – or in combination with other projects – is likely to significantly harm the designated features of a protected site. Regulators can only authorise activity if there is consensus that there would be no adverse impact on a site.

25-Year Environment Plan (to become the first Environmental Improvement Plan)
Published in 2018, the Plan sets out 25-year goals and targets across key areas. The Government proposed to update the Plan at least every 5 years in the Environmental Improvement Plan, and to report annually on progress to Parliament with a set of indicators to monitor progress. The Government has since published several annual progress reports, alongside the Outcome Indicators Framework.

Building Regulations
Building regulations are devolved across the UK, and cover relevant areas including overheating, water efficiency and flood resilience. More details are provided in section 3.

The Environment Bill & Act 2021
The Environment Bill was first announced in July 2018, with the aims of setting out how the Government would maintain environmental standards following Britain's exit from the EU, and placing the vision of the 25-Year Environment Plan on a statutory footing. It received Royal Assent in 2021. Some parts extend to the whole of the UK and others apply to specific UK regions. Key provisions of the Act include:

- A requirement for the publication of a policy statement setting out how key environmental principles are to be applied by Ministers during policymaking. The draft strategic policy statement was laid before Parliament in May 2022.
- The creation of the Office for Environmental Protection (OEP), which will have scrutiny, advice, and enforcement functions.
- The setting of long-term environmental targets in four "priority areas" of air quality, water, biodiversity and resource efficiency and waste reduction. A consultation on targets was held March to June 2022.
- A statutory requirement for the regular production of Environmental Improvement Plans by the UK government.
- Provisions relating to water resources management, including: the development of joint regional plans for long-term water resource management; a statutory duty for water companies to develop long-term drainage, sewerage management plans and targets; amendments to Ofwat's water company licensing process, and guidance on when abstraction licenses can be varied or revoked without compensation.

- The introduction of a biodiversity net gain requirement for new development, in England, through the planning system.
- An enhanced **duty to conserve and enhance** biodiversity (S102) and a duty to report on their actions (S103) and have regard to any relevant Local Nature Recovery Strategy (LNRS).
- The creation of **Local Nature Recovery Strategies** to cover the whole of England and support a national nature recovery network. With related guidance to be forthcoming.
- A requirement for ministers to make a statement to Parliament setting out the effect of new primary environmental legislation on existing levels of environmental protection.
- The Secretary of State will publish a report every two years to review significant developments in international environmental legislation.

Protection of Badgers Act 1992
Badgers and their setts are protected against killing, injury, disturbance and damage/destruction. A licence may be required to destroy or interfere with a sett.

Hedgerows Regulations 1997
Certain hedgerows, particularly those in the countryside aged 30 years or older, are protected from removal. Stipulated hedgerows require screening for Hedgerow Regulations protection. Regulations set out the procedure for when to notify the local planning authority, replacement and retention notices, and for local planning authority records of hedgerows.

Flood and coastal erosion risk management Policy Statement (2020)
This statement sets out the UK government's current, recent, and proposed flood and coastal erosion policy actions, including plans to reform the current approach to flood and erosion risk and promote nature-based solutions, integrated water management, and catchment-based approaches. Local flood and coastal erosion plans will link with wider plans for an area such as water resource-focused and local nature recovery strategies to secure multiple benefits.

The Water Environment (Water Framework Directive) (England/Wales) Regulations 2017
Each public body must, in exercising their functions affecting a river basin district, have regard of the river basin management plan. Natural flood management techniques can support the implementation of river basin management plans and the duty to have regard to them.

Climate and Ecological emergency declarations
Mass protests in 2019 led many local authorities to declare climate and/or ecological emergencies. The form of declaration varies by authority, yet they all function in a similar way, stating the authority's intention to take leadership in combating threats to the ecosystem.

The process begins when a councillor brings a motion to the council, which other councillors can choose to pass or reject – with a majority required for the motion to succeed. Declaring an emergency, and setting a target, is only the first step, and authorities have different approaches to implementation. Some are focusing on how to achieve resilience and nature restoration in their day-to-day operations and areas of direct control; other authorities are considering their full array services and functions, including planning.

Key national policies and legislation

This section outlines the key drivers, interpretations, legislation and policy relating to international and national requirements in all four nations.

England

The Natural Environment and Rural Communities Act (NERC) 2006	Section 40 of the NERC Act places a duty on public authorities in England to *'have regard to the conservation of biodiversity in exercising their functions'*. 'Conserving biodiversity' may include enhancing, restoring or protecting a population or a habitat. Many local authorities subsequently produced Local Biodiversity Action Plans (BAPs) in order to comply with this duty. Section 41 requires the Secretary of State to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of "principal importance" for the purposes of conserving biodiversity in England. These priority habitats and species are drawn from UK BAP. These lists are required by decision-makers in local and regional authorities when carrying out their duties under Section 40.
Biodiversity 2020: A strategy for England's wildlife	The Strategy set key goals for: • Better wildlife habitats – quality goals for priority habitat and Sites of Special Scientific Interest (SSSIs) • More, larger and less fragmented areas for wildlife – an increase in priority habitats by at least 200,000ha • The restoration of 15% of degraded ecosystems and an overall improvement in the status wildlife and prevention of further human induced extinctions of known threatened species. This is in line with the 25-year Environment Plan and will be replaced by a new strategy for nature.
The Planning and Compulsory Purchase Act 2004	This sets out the structure of the local planning framework for England and Wales. Local planning authorities are bound by the legal duty set out in Section 19 of the Planning and Compulsory Purchase Act 2004, as amended by the Planning Act 2008, to ensure that planning policy contributes to the mitigation of, and adaptation to, climate change.
Neighbourhood Planning Act 2017	The Neighbourhood Planning Act 2017 strengthened the powers of neighbourhood plans and created a legal duty on local planning authorities to set out their strategic priorities. The Westminster government has now indicated that these priorities should be expressed in a strategic plan. This plan is focused on high-level strategic issues set out in the NPPF, and these issues include action on biodiversity and climate adaptation. It seeks to enable effective catchment-scale planning for flood risk as well as landscape-scale planning for green infrastructure.
Planning Act 2008	The Planning Act 2008 introduced a new planning regime for Nationally Significant Infrastructure Projects (NSIPs). The Westminster government has produced National Policy Statements (NPSs) to guide decisions on such projects, applications for which are decided by the Planning Inspectorate. LPAs need to apply aspects of the NPS series to relevant applications.

National Flood and Coastal Erosion Risk Management Strategy for England	This strategy, led by the Environment Agency, describes the roles of risk management authorities (RMAs) involved in flood and coastal erosion risk management, including: lead local flood authorities, district councils, internal drainage boards, highways authorities and water and sewerage companies. They must exercise their flood and coastal erosion risk management (FCERM) activities, including plans and strategies, consistently with the strategy.
National Planning Policy Framework (NPPF)	The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. Applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise. The NPPF must be taken into account in preparing the development plan and is a material consideration in planning decisions. Planning policies and decisions must also reflect relevant international obligations and statutory requirements. The Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the Planning Act 2008.
The National Framework for Water Resources	The framework sets out how much water the nation is likely to need, and the contribution expected from each region to meet water demand across all sectors, up to, and beyond 2050. It sets out principles and outlines expectations of water companies and regional groups in planning for a secure and sustainable water supply and their region-specific ambitions. Each regional group must produce a single plan that builds resilience to a range of uncertainties and future scenarios. Together, the five regional plans must add up to meet the collective national need. Water supply solutions in regional plans must be reflected and implemented through individual water company WRMPs.
Flood and Water Management Act 2010 (England)	The Flood and Water Management Act 2010 aims to address the threats of flooding and water scarcity. The Environment Agency is responsible for managing flood risk from main rivers, the sea, and reservoirs. Lead local flood authorities (LLFAs) are responsible for local sources of flood risk, in particular surface water run-off, groundwater, and ordinary watercourses. LLFAs are statutory consultees on major development. Local authorities are responsible for ensuring that requirements for preliminary flood risk assessments are met. Defra have announced that they are reviewing the case for implementing Schedule 3 to the Flood and Water Management Act 2010 in England to help reduce the use of storm overflows by setting mandatory build standards for sustainable drainage schemes on new developments.
Nature Recovery Green Paper	This paper sets out initial proposals regarding the consolidation of protected sites legislation, assessment, and management, including potential changes to habitat regulations and consolidated species-based protections. It also outlined plans for what could be counted towards the 30 by 30 target.
England Trees Action Plan	The England Trees Action Plan 2021 to 2024 sets out the government's long-term vision for the treescape it wants to see in England by 2050. The plan provides a strategic framework for implementing the 'Nature for Climate Fund' and outlines policy actions the government is taking to help deliver this vision.

	A monitoring and evaluation plan for the action plan will be created alongside a detailed evaluation framework
SEA & EIA reform	Strategic Environmental Assessments and Environmental Impact Assessment processes and regulations are being reviewed by the UK Government. This will require primary legislation, and a consultation is expected for England on new regulations. Biodiversity and adaptation are likely to feature in the simplified assessment criteria for plans and applications that fall within the scope of the regulations.

Wales

Planning Policy Wales	Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs1, MTANs2 and policy clarification letters comprise the national planning policy. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development objectives as required by the Planning (Wales) Act 2015, the Wellbeing of Future Generations (Wales) Act 2015, and other key legislation.
Future Wales: The National Plan 2040	Future Wales is the national development framework for Wales and has development plan status. Future Wales is a spatial plan, setting a direction for infrastructure and development. As the national development framework, Future Wales is the highest tier of development plan and is focused on solutions to issues and challenges at a national scale. Its strategic nature means it does not allocate development to all parts of Wales, nor does it include policies on all land uses. It is a framework which will be built on by Strategic Development Plans at a regional level and Local Development Plans at local authority level.
Wellbeing of Future Generations (Wales) Act 2015 and Future Wales	The Wellbeing of Future Generations (Wales) Act 2015 ('The Act') aims to improve the social, economic, environmental and cultural wellbeing of Wales, protecting the country's assets for the future. It sets out the 7 wellbeing goals for national government, local government, local health boards and other specified public bodies. The Act also details five ways of working, (long-term, integration, involvement, collaboration, prevention), which public bodies must follow in developing policy and delivery of services. It details the ways in which these bodies must work, and work together, to improve the wellbeing of Wales. It is through the Act that Wales will make its contribution to the 17 UN Sustainable Development Goals.
The Environment (Wales) Act 2016	Section 6 under Part 1 of the Environment (Wales) Act introduced an enhanced duty for public authorities in the exercise of functions in relation to Wales. The S6 duty requires public authorities seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions and in so doing promote the resilience of ecosystems. The Act requires Natural Resources Wales to prepare and publish a State of Natural Resources Report (SoNaRR) which assesses the state of Wales' natural resources and provides an assessment of the extent to which Sustainable Management of Natural Resources (SMNR) is being achieved. SoNaRR is an evidence base for Welsh Ministers to use when preparing or revising the Natural Resources Policy, Natural Resources Wales to use when preparing area statements, and for local planning authorities to reference when refreshing local development plans. Part 7: Flood & Coastal Erosion Committee and land drainage clarifies the law for other environmental regulatory regimes including flood risk management

	and land drainage, and requires Welsh Ministers to publish and maintain lists of species and habitats in Wales that are regarded as of 'principal importance' for the purpose of maintaining and enhancing it biodiversity.
Natural Resources Policy	The Natural Resources Policy (NRP) is the second statutory product of the Environment (Wales) Act 2016. The focus of the NRP is the sustainable management of Wales' natural resources, to maximise their contribution to achieving goals within the Wellbeing of Future Generations Act. The policy sets out three National Priorities: • Delivering nature-based solutions • Increasing renewable energy and resource efficiency • Taking a place-based approach The NRP covers and integrates a broad range of traditional policy areas (including water, food and drink, farming and agriculture, forestry, waste, energy, countryside access and the environment) and intends to maximise contribution across the Seven Wellbeing Indicators. The Natural Resources Policy sets the context for Area Statements produced by NRW, which aim to deliver the national priorities at a local level. The Area Statements specify priorities, risks and opportunities for sustainable management of natural resources and highlight how NRW proposes to address them. Area Statements are also an evidence base to help the Welsh Government's Natural Resources Policy at the local level.
The Nature Recovery Action Plan	The Nature Recovery Action Plan sets out how Wales will address the Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity and the associated Aichi Biodiversity Targets in Wales. It is the National Biodiversity Strategy and Action Plan for Wales and exists as a live document that all with an interest have a responsibility to review as policies and priorities evolve. The Nature Recovery Action Plan was produced by the Wales Biodiversity Strategy Board, members of which represent both land and sea managers, Natural Resources Wales, the environmental third sector, local authorities, Wales Biodiversity Partnership, and the Welsh Government. The Nature Recovery Action Plan Implementation Group, chaired by the Welsh Government, provides the direction for the Nature Recovery Action Plan.
Prosperity for All: A Climate Conscious Wales	Section 80 of the Climate Change Act places requirements on Welsh Ministers to produce a regular report on the Welsh Government's objectives, actions and future priorities regarding the impacts of climate change. Prosperity for All: A Climate Conscious Wales is Wales' climate change adaptation plan published in 2019. It presents the Welsh Government's plans over the next five years.
The Flood and Water Management Act 2010 (Schedule 3)	In January 2019, The Flood and Water Management Act 2010 schedule 3 came into force in Wales, which requires all new developments of more than 1 dwelling house or where the construction area is 100 square meters or more, to include sustainable drainage systems (SuDS) for surface water. The SuDS must be designed and built in accordance with Statutory SuDS Standards published by the Welsh Ministers and SuDS Schemes must be approved by the local authority acting in its SuDS Approving Body (SAB) role, before construction work begins.

Scotland

Scottish Planning Policy (SPP)	The Scottish Planning Policy (SPP) sets out national priorities for development and the use of land, laying out how planning matters should be addressed by local authorities across the country. It exists as non-statutory guidance and is a statement of Ministers' priorities. Section 3D of the Town and Country Planning (Scotland) 1997 Act requires that functions relating to the preparation of the National Planning Framework by Scottish Ministers and development plans by planning authorities must be exercised with the objective of contributing to sustainable development. Under the Act, Scottish Ministers can issue guidance on for which planning authorities must have regard. The Principal Policy on Sustainability is under section 3E of the Act.
National Planning Framework (NPF4)	The Planning (Scotland) Act 2019 was passed by the Scottish Parliament in June 2019, including provisions for the preparation of a new National Planning Framework (NPF4). NPF4 will, when adopted, set out the Scottish Government's priorities and policies for the planning system up to 2045, outlining how planning and development will help to achieve a net-zero, sustainable Scotland by 2045. NPF4 differs from previous NPFs in two ways: it incorporates Scottish Planning Policy and the NPF into a single document and will form a part of the statutory development plan. Statutory development plans must have regard to the NPF, and Scottish Ministers expect planning decisions to support its delivery. The National and Regional Marine Plans should also be considered, where relevant. The amended Town and Country Planning (Scotland) Act 1997 also directs that the National Planning Framework must contribute to a series of six outcomes: 'improving the health and wellbeing of our people'; 'increasing the population of rural areas'; 'meeting housing needs'; 'improving equality and eliminating discrimination'; 'meeting targets for emissions of greenhouse gases'; and 'securing positive effects for biodiversity'.
The Scottish Biodiversity Strategy (SBS)	The SBS reflects the aims of key international strategies: 1. The UN Convention on Biological Diversity, which set the Aichi Targets (2010) to halt biodiversity loss and restore the natural environment to health. 2. The European Union's Biodiversity Strategy for 2020 (2011). The Scottish Biodiversity Strategy (SBS) Coordination Group, chaired by NatureScot, oversees reporting and delivery of the Scottish Biodiversity Strategy. It encompasses *Scotland's Biodiversity: It's in Your Hands* (2004) and the subsequent *2020 Challenge for Scotland's Biodiversity* (2013) – the strategy for the conservation and enhancement of biodiversity in Scotland and its implementation document: 'Scotland's Biodiversity: A Route Map to 2020'. The Scottish Biodiversity Strategy indicators are used to measure progress towards the 'Scotland's 2020 Challenge' aims to: • Protect and restore biodiversity across the land and sea habitats, and support healthy ecosystems.

	• Connect people with the natural world, for their health and wellbeing, and to involve them more in decision making. • Maximise the benefits for Scotland of a diverse natural environment and the services it provides, contributing to sustainable economic growth. Further revisions to are planned in line with the global CBD framework.
Scottish biodiversity strategy post-2020: statement of intent	In response to delays in the international negotiations to deliver a new global biodiversity framework, the Scottish Government published its Biodiversity Strategy statement of intent. This sets out the direction for a new biodiversity strategy which will aim to tackle the twin challenges of biodiversity loss and climate change. The Scottish Government has also committed to increasing protected areas for nature to at least 30% of Scotland's land area by 2030.
Scotland's Environment Strategy 2020	The Environment Strategy creates an overarching framework for Scotland's existing environmental strategies and plans, including the Climate Change Plan in order to identify new strategic priorities and opportunities. These will be reviewed over time, to reflect international targets and other policy developments and plans. It sets out a vision for Scotland's environment, in line with the UN SDGs, and identifies key outcomes to achieve this.
Nature Conservation Act (Scotland) 2004	Under the Act, public bodies in Scotland have a duty to further the conservation of biodiversity. The Wildlife and Natural Environment (Scotland) Act 2011 also introduced a requirement for all public bodies in Scotland to make a report publicly available on their compliance with the biodiversity duty. Biodiversity duty reports are required every three years.
Scottish climate change adaptation programme 2019-2024	The Programme is a requirement of the Climate Change (Scotland) Act 2009 to set out plans to address the risks in the UK Climate Change Risk Assessments (CCRA), published under the UK Climate Change Act. It takes an outcomes-based approach, derived from both the UN Sustainable Development Goals and Scotland's National Performance Framework. This aims to promote co-benefits and integrate adaptation into wider policy. There are seven key Outcomes, each split into Sub-Outcomes.
Flood Risk Management (Scotland) Act 2009 implementation	A framework for coordination and cooperation at a national and local level was developed in the Flood Risk Management (Scotland) Act 2009 which sets out the roles and responsibilities of the key agencies involved in flood risk management, notably the Scottish Environment Protection Agency (SEPA) and responsible authorities such as local authorities and Scottish Water. The Act requires management of flood risk from rivers, the sea, and sewage systems. SEPA is responsible for co-ordinating flood protection strategies alongside local authorities, to ensure local accountability and the delivery of flood protection schemes. Regular reports laid before Parliament under Section 52 of the Flood Risk Management (Scotland) Act 2009 outline the progress of work being carried out through the implementation of the Act.
NatureSco: Developing with Nature guidance	NatureScot has published draft guidance for consultation to inform the approach to Policy 3(e) on the Nature Crisis in National Planning Framework 4. This policy refers to the inclusion of '*appropriate measures'* to enhance biodiversity for certain local and non-EIA development. The draft guidance provides advice on 23 measures, including managing water with nature, providing homes for nature and planting for nature.

Northern Ireland

The Planning (Northern Ireland) Act	The Act created the two-tier planning system and devolved planning to local planning authorities, introducing a local development plan-led system to Northern Ireland. Local councils possess a range of planning powers, including the preparation of local development plans, the determination of most applications, and responsibility for enforcement action. They must produce community strategies, and the Act ties these to local development plans – making the latter the spatial interpretation of the community strategy.
Regional Development Strategy (RDS)	The Strategy (RDS) is the spatial strategy of the Executive for Northern Ireland to 2035. The RDS contains both a Spatial Framework and Strategic Guidelines. It is prepared under the Strategic Planning (Northern Ireland) Order 1999. The Department for Regional Development (DRD) is responsible for formulating "in consultation with other departments, a regional development strategy for Northern Ireland. The Order also requires Departments to "have regard to the regional development strategy" in functions related to development. The RDS is material to decisions on individual planning applications and appeals.
The Strategic Planning Policy Statement for Northern Ireland	Published in September 2015, the Statement consolidated 20 different planning policy statements into one document and set out strategic subject planning policy for a wide range of planning matters. The provisions of the SPPS must be taken into account in the preparation of Local Development Plans, and are also material to decisions on planning applications and appeals.
The Northern Ireland Biodiversity Strategy 2015	The Strategy aimed to halt the loss of biodiversity and ecosystems services by 2020. It set out how Northern Ireland planned to meet its international obligations for halting the loss of biodiversity in the Programme for Government for 2011-2015. Furthermore, the Wildlife and Natural Environment Act (Northern Ireland) 2011 places a duty on public bodies to further the conservation of biodiversity. It built on the first Biodiversity Strategy published in 2002, with an Implementation Plan accompanied by a set of time-bound actions. It included a commitment to 'consider the outcomes of the consultation on Biodiversity Offsetting carried out by Defra and decide on the way forward in Northern Ireland'. A consultation on a new strategy for NI is anticipated in 2022 in conjunction with COP15 and reflecting the Nature Positive 2030 report.
The Green Growth Strategy	The Green Growth Strategy is the Executive's overarching multi-decade plan for balancing climate, the environment, and our economy. It will involve all parts of government and society from policy development to delivery.
The Environment Strategy	The Environment Strategy sets out Northern Ireland's environmental priorities for the coming decades and forms part of the Executive's Green Growth agenda. The Strategy sets out six Strategic Environmental Outcomes (SEOs) which encompass all of the main environmental challenges over the coming decades. The Strategy will be adopted as Northern Ireland's first 'Environmental Improvement Plan' which, subject to the approval of the NI Assembly, will be a statutory requirement under the future UK Environment Act, setting the Strategy in a legal context and putting in place a statutory requirement to monitor environmental progress against the Strategy on an annual basis.

The Nature and Resilience Playbook

Part 1 – Local Strategies and target setting

Section Contents

Summary of recommendations

I. Introduction
II. Developing a strategy
   a) Preparation and scoping
   b) Assemble and engage with a group of key stakeholders
   c) Develop a comprehensive evidence base & baseline assessment
   d) Target setting
   e) Securing delivery

Useful examples

-> Previous section: Introduction

-> Next section: Part 2: Strategic and Spatial Planning

Summary of recommendations

Recommendation 1: Produce or refresh an appropriate, cross-departmental strategy

A clear, cross-departmental strategy is essential for raising the profile of biodiversity and climate resilience across an authority, as well as subsequently informing a development planning. Depending on local circumstances, including capacity constraints, knowledge gaps and policy requirements, authorities should identify and deliver the most appropriate route to putting in place a strategy, considering:

- *Refreshing or developing of a Biodiversity Action Plan (or future Local Nature Recovery Strategy England).*
- *A Green and Blue Infrastructure Strategy.*
- *A dedicated Adaptation Plan.*
- *A Tree Strategy.*

In order to maximise the multifunctional benefits of relevant solutions a joined-up, strategic approach should be taken.

Recommendation 2: Form - and engage with - an appropriate partnership of key stakeholders

A coalition of willing partners and stakeholders in the area should be convened to take forward and help resource development of an appropriate strategy. Opportunities should be sought to link in with existing partnerships, i.e. Local Nature Partnerships to coordinate priorities and prevent duplication.

Recommendation 3: Deploy and utilise a robust evidence base to baseline local circumstances

Gathering and deploying an extensive evidence base to baseline the state of biodiversity and resilience in local areas is essential for delivering a robust strategy based on proper targets and effective interventions.

Authorities should utilise extensive data sets, such as local environmental records centres, GIS data and tools currently available, before – if required and resourcing allows – commissioning or working with partners on bespoke assessments and tools to provide a more detailed picture.

Recommendation 4: Set robust, measurable targets

Authorities should set clear, measurable targets for biodiversity and resilience enhancement across their operations and localities. As a minimum, these should align with national and international commitments. More ambitious targets should seek to implement targeted interventions, including for specific habitats, species recovery and green infrastructure provision.

Recommendation 5: Help secure delivery by setting out clear action plans, responsibilities, and financing options

A strategy should include clear actions and cross-departmental responsibilities for achieving targets. This should include targeted action on key species, habitats and climate risks. Securing the long-term sustainable management of related assets and interventions will be a critical challenge, and different financing mechanisms under development should be explored.

i. Introduction

A cross-department strategic approach, with key targets and appropriate progress indicators, is essential for ensuring nature recovery and climate resilience are embedded across all authority decision making, service provision, and planning.

As outlined, authorities across the UK also have several responsibilities, duties and obligations related to delivering both local climate resilience and nature recovery, with implications for new development. The key types of local strategy associated with meeting these obligations are:

1. Biodiversity Action Plans (BAPs) - Or Ecological Emergency Strategies / Action Plans
    a. Local Nature Recovery Strategies (ENG)
2. Green and Blue Infrastructure Strategies
3. Adaptation Strategies/ Action plans
4. Tree Strategies

ii. Developing a strategy

a) Preparation and scoping

Various models currently exist for plans and strategies, and both the content and structure of these models vary in line with local capacity and circumstances. In deciding what kind of strategy to produce or update, and what model(s) to pursue, authorities should be cognisant of:

- Policy and legal requirements [outlined in the introduction]
- Existing work, research and capacity
- Future policy requirements
- Local commitments or declarations
- Current knowledge gaps

Although requirements will vary across authorities, we recommend the following models and associated guidance. These approaches represent viable ways to ensure authorities meet their associated obligations and follow best practice, whilst building on previous work where available.

Biodiversity Action Plans (BAPs) / Ecological Emergency Action Plans (EEAPs)

Local Biodiversity Action Plans (LBAPs) were developed to translate the implications of the CBD, national BAP priorities and targets into local action, including identifying which UK priority species and habitats are found in a local area (and associated conservation opportunities). They could be compiled by the local authority, to comply with relevant duties, or through Local Biodiversity Action Plan Partnerships, involving one or more local authorities and conservation organizations at either a county or regional level.

Ecological Emergency Action Plans (EEAPs) function in a similar way to updated BAPs, although often without the residual connection to the CBD and the derived priority species and habitat lists. Action Plans provide a strategic framework for the local authority, encompassing both its own

operations and identifying wider actions, targets, and policy opportunities to tackle biodiversity decline locally.

Local Nature Recovery Strategies (ENG) - Authorities in England will have to produce Local Nature Recovery Strategies (LNRS) to underpin the development of a national Nature Recovery Network. They will support the delivery of mandatory biodiversity net gain through mapping the most valuable existing habitats, writing specific proposals for creating or improving habitat for nature and wider environmental goals, and agreeing priorities for nature's recovery.

The five recent LNRS pilots highlighted the importance of tapping into existing networks, capacity and data (including preliminary work from BAPs) as well as the importance of partnership working going forwards, as no single grouping currently exists to provide all the necessary inputs. Key limitations included authority access to up-to-date local data and the accessibility of national-level data.

Benefits, scope and when to use them

- To comply with related legal biodiversity duties, such as Section 40 of the NERC Act.
- Developing (or updating an existing BAP) as the basis for a local action or priority framework to take action in response to local ecological emergency declarations.
- To provide an up-to-date evidence base or target framework to support a development plan.
- To prepare for, and inform, the creation of Local Nature Recovery Strategies (ENG)
- To provide CBD-derived species and/or priority habitat lists, accompanied by targeted, relevant actions.
- To apply to local authority's own operations.
- To link BAP species, or other **priority habitat** data, to updated strategic targets, policies, and priorities.

Green and Blue Infrastructure Strategies

Green and Blue Infrastructure (GI/BI) strategies were initially developed in line with regional strategies to then inform policy objectives at sub-regional scales. However, with the revocation of the regional planning tier in 2010, GI and BI strategies have become increasingly diverse, with the scale of implementation equally varied. To date, GI strategies have been developed regionally, sub-regionally, at combined and local authority levels, neighbourhood scales to inform and map local GI, including key priorities, local benefits and opportunities.

They often serve as an overarching framework or strategy for identifying, mapping, and promoting the delivery of key environmental opportunities and benefits in a local area and can be referenced and incorporated into local development plans. BI strategies, typically considered in succession to, and derived from GI implementation, are key to meeting standards of the Water Framework Directive and Habitats Directive and BNG requirements. BI strategies, including SuDS Implementation, should ideally be considered in tandem with GI during the design stages to ensure maximum benefits and lower long-term fixed costs.

Benefits, scope, and when to use them

- A GI approach is often considered to be a more holistic and adaptive form of land-use and development planning than traditional 'grey' approaches.
- Multifunctional GI strategies require collaborative governance arrangements as well as a clear definition of what constitutes 'good'.
- GI strategies provide a framework and set key principles for local authorities that can inform other plans and policies, infrastructure delivery requirements and CIL schedules (where applicable).

- GI strategies can map and identify opportunities for GI protection and enhancement, which can be informed by other existing local strategies (e.g., a BAP), to support local strategic policies.
- GI strategies help provide a holistic approach and evidence base for forthcoming nature recovery planning, including Local Nature Recovery Strategies (England) and future environmental net gain priorities.
- They should include multifunctional, spatial assessments of existing GI provision, recognising both gaps in coverage and variances in quality. The Accessible Natural Greenspace Standards (ANGSt) offer a valuable framework to assess existing GI provision against, to inform strategic planning.
- They should develop an understanding of local GI needs and priorities and set clear, strategic goals for the delivery of multifunctional GI and key actions.
- They should consider the wider policy landscape, outlining how they are to be aligned with or incorporated within Local Development Frameworks (at local authority level), or broader spatial frameworks.

The National Green Infrastructure Framework contains guidance on how to approach GI Strategy, partnership and evidence gathering. Associated process journeys for developing a GI Strategy are also being developed.

Adaptation Strategies

To comply with current legal duties and national policies on climate adaptation whilst considering the findings of national-level adaptation programmes in a local setting, many authorities have developed specific adaptation strategies to identify high-priority local risks, relevant areas of local authority responsibility, notable vulnerabilities, and suitable responses.

These should build and draw on existing strategies across key risk areas, such as the **Local Flood Risk Management Strategies** (ENG) produced by lead Local Flood Authorities (LLFAs)**. (For a full list, see Section 2)**

Benefits, scope, and when to use them

- To identify (and ideally map) specific, high-priority local climate risks.
- To support a strategic approach to climate adaptation and help accurately inform both wider strategies and development plans, including multifunctional GI priorities and policies.
- To identify priority action areas within an authority and set appropriate targets.
- They can either be a local reflection of, or response to, the priority risk areas identified in national risk assessments, or reflect how key climate risks are related to specific authority function areas.

Tree Strategies

A tree strategy is a plan for managing trees in a specific area. Much like a BAP, it can sit under an overarching GI strategy, providing greater specificity and detail on canopy cover, species, and risks and opportunities to local tree stocks.

A strategy allows a local authority to manage the trees it looks after and identify planting opportunities. It takes the benefits and risks of trees into account, setting long-term goals to drive up tree numbers and canopy cover, diversify the tree stock, and protect existing trees moving forward. A list of existing tree strategies has been compiled by The Tree Council.

Benefits, scope and when to use

- To support the delivery of a well-established GI intervention and develop specific coverage targets.
- To support compliance with national policies, National Tree Strategies and targets, and to help identify opportunities for delivering multifunctional benefits.
- To support the delivery associated local GI strategies, adaptation, and biodiversity priorities.

If resources allow, it is recommended that updates take as holistic an approach as possible, covering intended policies, targets, species, habitats, sites, and thematic priorities, as well as direct authority operations and processes.

Case Study: Local Environmental Improvement Plans

In order to draw together different environmental strategies and plans, RTPI and others have proposed the creation of unifying 'Local Environment Improvement Plans'.

These would develop a shared understanding of the wider environment and local priorities, including problems and opportunities. These could be operated through Green Growth Boards, which would be a forum for all the relevant strategies within a territory to be assessed and considered.

b) Assemble and engage with a group of key stakeholders

Effective stakeholder engagement is essential to ensure all interested and knowledgeable parties participate in developing a successful strategy. Likewise, a collaborative approach is an effective a way of identifying and pooling local resources, expertise and project opportunities alongside ways to maximize the reach and influence of the strategy.

Key partners and organizations to involve in formulating and delivering a strategy include:

- Local Environmental NGOs, e.g., Wildlife Trusts, RSPB.
- Local Environmental Records Centres, including the Association of Local Environmental Records Centres (ALERC).
- Local Community and species preservation groups.
- Existing climate, nature and broader related Partnerships, as well as advisory committees and commissions (e.g., Citizens assemblies).
- Local Universities and relevant research institutions.
- Local Economic Partnerships (LEPs).
- Local Nature Partnerships (LNPs).
- Water companies & Catchment Partnerships.
- Local landowners, farmers, managers and associated representative bodies.
- Statutory bodies and agencies (e.g., Environment Agency, Natural England, NatureScot and Natural Resources Wales).
- Neighbouring local authorities.
- Local flood and resilience partnerships or fora.
- Local Business Partnerships and networks, (e.g., Bristol Green Capital Partnership).
- Internal, cross-departmental collaboration, particularly between:

  - **Highways Authorities & Teams**: To help enable the inclusion of more naturalised Sustainable Drainage solutions within highways schemes and long-term sustainable management.
  - **Waste, parks, and schools**: To consider opportunities on their sites to better support biodiversity, sustainable drainage or water efficiency.
  - **ICT teams:** To enable effective environmental monitoring and data collaboration.
- Landowner membership organisations such as NFU, CLA, and abstractor groups.

Partnership models

A variety of strategic partnership models currently exist across the UK with the purpose of drawing together relevant stakeholders to develop and oversee related strategies and initiatives.

Bristol Green Capital Partnership	A community interest company whose events, forums and projects accelerate net zero and ecological action and are delivered collaboratively with a range of partners and members.
Bristol 'One City Partnership'	The One City Plan has six themed aims with supporting Boards, a partners group, and an advisory fora. They aim to work together to deliver on projects that will improve Bristol.
Norfolk Strategic Flooding Alliance (NSFA)	The NSFA brings together all agencies and partners involved in planning for and responding to flooding in Norfolk. It represents a single point of focus and collaboration. NSFA's strategy outlines its core objectives and is accompanied by an action plan, which identifies steps for the NSFA and its members to take to address the risk of flooding, including work on individual sites.
Climate Commissions	As an example, Edinburgh Climate Commission, an independent group working together to accelerate climate action and impact in Edinburgh. This Climate Commission is co-sponsored by the City of Edinburgh Council and the Edinburgh Climate Change Institute at the University of Edinburgh. It is part of the Place-based Climate Action Network (PCAN).
Local Nature Partnerships	Bringing together public, private and third sector organisations, often working closely with local authorities, Local Enterprise Partnerships (LEPs) and Health and Wellbeing Boards (HWBs) deliver and advise on matters relating to the natural environment and public policy. Key examples and initiatives: • Surrey Nature Partnership published a Natural Capital Investment Plan sets out the actions required to achieve and maintain healthy natural assets in Surrey over the next 25 years. • Dorset published a detailed Natural Capital Investment Strategy to encourage their Local Enterprise Partnership to take a 'natural capital approach' to project funding and delivery. • The West of England Nature Partnership commissioned 14 ecosystem service maps as part of the WENPs State of Environment Assessment. • Tees Valley Nature Partnership have produced Natural Networks Opportunity Maps with a view to informing future planning and development decisions.

Case Study: Reading Biodiversity Action Plan

In early 2020, a group from the Council, nature conservation organisations, local stakeholders and voluntary groups came together to write Reading's new BAP. They agreed on an overarching vision statement for biodiversity focused on reversing biodiversity decline by 2030, whilst simultaneously enhancing the resilience of the built and natural environments to climate change.

The BAP provides a coordinated framework for conserving and enhancing biodiversity and sets out the actions that will be taken to achieve this. It is organised around key functional themes rather than individual habitats and species. It includes as assessment of local habitats, land designations, relevant local stakeholders and landowners, alongside opportunities for action across council functions, such as planning, education and area management.

It will be overseen by Reading Borough Council's Planning Policy Team and be reviewed on a regular basis. It is strongly related to the Reading Borough Council Tree Strategy, which was produced and consulted upon at the same time. Both documents aim to achieve aspects of the response to the Climate Emergency declared by the Council in February 2019.

c) Develop a comprehensive evidence base & baseline assessment

Strategies, targets, allocations, and policies must build on a robust evidence base, acknowledging the spatial, environmental, and socio-economic needs and opportunities of an area. Ideally, relevant data should be displayed or represented spatially, in order to help inform development plans, allocations and policies and deliver strategic approach to nature's recovery.

Key information for a strategy includes:

Relevant land and conservation designations

Statutory	*Non-statutory*
• Sites of Special Scientific interest **(SSSIs)** • Special Areas of Conservation **(SACs)** • Special Protection Areas **(SPAs)** • Biosphere reserves • Wild Bird General License Protected Sites Condition Zone **(England)** • National Character Areas **(England)** • Ramsar **sites** • National Nature Reserves **(NNRs)** • Local Nature Reserves **(LNRs)** • Ancient Woodland	• **Local Wildlife Sites (LWS)** • **Biodiversity Opportunity (Nature Improvement) Areas (BOA)** • **Community forests** • Drinking Water Protected Areas Surface water (England) / Drinking Water Safeguard Zones (Surface Water) (England) • **National Forest (England)** • Catchment areas **(England)** • B-Lines (Buglife)
Relevant non-conservation designations	
• Areas of Outstanding Natural Beauty (AONB) • National Parks	• Green belt

Landowners and land managers

Once relevant habitats and land designations are identified, understanding and mapping who owns and manages the land will be crucial for integrated planning.

Notable local green infrastructure assets

Including named local parks, forests, water bodies, public gardens and community assets.

Habitats and ecosystem classifications

These can be categorised as follows:

- **'Phase 1' habitats -** Habitats are classified to a broad type such as woodland, grassland, open water, etc., and then sub-divided further to provide the Phase 1 habitat type broad leaved semi-natural woodland.
- **Priority Habitats -** Published via the JNCC as a requirement under the NERC Act [England] and linked to national BAPs.
- **National Vegetation Classification (NVC)**
- **Integrated Habitats Classification (IHS) -** An integration of existing classification systems including Priority Habitats, Phase 1 and NVC. It was developed for use with modern IT systems and is increasingly used for mapping habitats.

For ease and consistency with other reporting initiatives, it is recommended that **priority habitats** are used as the main form of habitat categorization.

Local resilience risks

Including flood risk areas, localised overheating (Urban heat Island), coastal erosion, water stress (see climate risk datasets below)

Case Study: Hertfordshire Strategic Green Infrastructure Plan

The Hertfordshire strategic Green Infrastructure plan aims to assess existing GI assets, their socio-environmental economic value, and maintenance or enhancement opportunities.

To achieve this, Hertfordshire has proposed the creation of a 'green network' engaging key community, professional and statutory bodies to deliver a series of potential GI projects. This will be completed using a two-tiered approach for seven districts, Green Infrastructure plans for Hertfordshire's GreenArc, and 'local level' Green Infrastructure plans.

An up-to-date **baseline assessment** of the current state of the environment – including biodiversity and local climate risks – is essential in developing a coherent strategy that responds effectively to local conditions and ensures measurable progress. Several authorities have commissioned bespoke studies, assessments, or mapping tools to quantify the state of their local biodiversity and/or climate risks and ensure progress towards their targets can be monitored.

Given authority resourcing constraints, it is recommended authorities work closely with key partner organisations, such as those active in conservation, in order to help develop a robust evidence base.

In addition, several tools are currently available which can be used to provide initial spatial evidence. Many authorities already use Geographical Information Systems (GIS), and associated data, to help inform and deliver their services, and these should be deployed to help inform holistic strategy development and subsequent spatial planning. However, in order to accurately assess the state and full condition of particular habitats, risks, and species in a local area, a more detailed, bespoke approach, involving relevant organisations, is recommended.

Climate risk data sets & sources

- **Met office historical data** - UK Climate Averages can be used to determine baseline climatic conditions at climate stations throughout the UK
- **UK Climate projections (UKCP18)** - The most up to date Met Office assessment of how the UK climate may change in the future
- **UK Climate Risk Indicators mapping tool** - Using the UKCP18 dataset, it includes a variety of climate risk variables can be investigated at a range of scales including regional, county, district, and local authority boundaries
- **UK Sea Level Rise Projections** (Met office)
- **Met Office UK annual temperatures**, past and future
- **Flood risk management plans (FRMPs)**
- **Natural flood management maps**
- Natural Hazard Partnership's Daily Hazard Assessment of elevated wildfire conditions; Fire Severity Index (FSI) Met office
- **National flood risk map data sets - England[4], Scotland, Wales, Northern Ireland**
- **River basin management plans**
- **Water stressed areas** (England)
- **Natural Coastal Erosion Risk Mapping**
- **Shoreline management plans (SMPs)**
- **Local Flood Risk Management Strategies (ENG)**
- Water Resource Management Plans (water companies -ENG)
- **Regional Water Resource Plans (ENG)** (See Section 2)
- **Drought Plans** (water companies) Environment Agency area drought plans (available on request) (ENG); Water Resources Wales (Drought plans); Drought management Framework; Water situation reports for England

Biodiversity & Habitats

- **DEFRA MAGIC map -** covers rural, urban, statutory, non-statutory, coastal and marine designations, priority species and habitats across the whole of the UK.
- **Local environmental records centres -** Find your LERC.
- **UK Biodiversity indicators** (inc. wild bird & butterfly populations)
- **Birds of Conservation Concern 5.**
- **IUCN – compliant Red List for Britain's Terrestrial Mammals.**
- **Natural England GI Mapping (England)** - brings together data from over 40 individual environmental and socio-economic datasets. Local authorities and others may use the

[4] Check the long term flood risk for an area in England, https://www.gov.uk/check-long-term-flood-risk; Flood risk maps 2019 https://www.gov.uk/government/publications/flood-risk-maps-2019;

database to inform the development of local plans, policies and GI strategies, and can download the spatial files to add their own data to it.

- **Previous Biodiversity Action Plans (BAPs).**
- **Habitat map of Scotland.**
- **UK Hab: UK Habitat Classification system -** covers terrestrial and freshwater habitats applicable to multiple geographic scales; from small urban areas to large national habitat mapping
- **Woodland Trust Ancient tree inventory**
- **National Biodiversity atlas (National Biodiversity Network)**
- **LANDMAP - the Welsh landscape baseline/ Natural Resources Wales interactive Map**
- **DAERA Map Viewers (NI)**
- The Urban Nature Atlas, developed as part of the NATURVATION project
- JCC mapping of NVC types [2008] - a classification and description of the plant communities of Britain. This data is available as Excel-based mapping tools.

Case Study: Worcestershire Biodiversity Action Plan Mapping Tool

This online mapping tool was developed to provide an element of spatial targeting to the BAP. The map uses the Environmental Character Area units of landscape, developed for the county's Green Infrastructure Strategy, as the basis for enabling users to see which BAP habitats and species are of most relevance to different geographical parts of the county.

Clicking on the map launches a pop-up containing a list of the Biodiversity Action Plans, highlighting which of the Plans it is most recommended to read and based on the Environmental Character Area a location falls within.

Other key tools and useful approaches:

- The RTPI's Climate Tools for planners online resource outlines useful climate adaptation and mitigation tools that can be used in development management and plan-making.
- The Climate Just mapping resource can help to consolidate map-based data on risks and vulnerabilities, including heat, fuel poverty and flooding.
- Developed by Kent County Council, the Severe Weather Impacts Monitoring System (SWIMS) is a tool for use within organisations to record the response to - and impacts on - organisations from severe weather events (resources, budgets, service delivery disruption etc.)
- LGA Guidance on geospatial information, tools, and case studies.

d) Target setting

Ambitious but realistic local resilience and nature targets are an essential component of a strategy in order to guide and motivate action, as well as support measurable progress.

Targets can dovetail with national policy obligations or seek to go beyond and deliver more ambitious progress locally. Key examples of overarching targets or goals that can be incorporated in an authority vision statement or strategy include:

Targets	Examples
Quantitative targets	
Coverage The % of an area to be covered by a specific type of GI, most frequently applied to tree cover and greenspace.	London Environment Strategy ○ Making more than 50% of London green by 2050 ○ Increasing tree canopy cover by 10% by 2050 Essex Climate Commission ○ 30% of all land in Essex will enhance biodiversity and the natural environment by creating natural green infrastructure. 25% by 2030 and 30 per cent by 2040. ○ 30% greening of towns, villages, and new developments by 2040
Units The number of GI units or features created, either annually or over the lifespan of a strategy, most frequently applied to trees planted or individual GI projects (i.e., SuDS interventions). Quantitative Units targets can also apply to finance invested in GI projects.	Southampton's Our Greener City Plan 2030 has set unit-oriented targets to: ○ Introduce at least 25 new urban wildflower meadows by 2025 ○ Plant at least 5,000 trees in public land by 2030
Thematic targets	
Aspirational: Descriptive goals relating to the anticipated benefits of GI or NBS provision. Often framed as overarching principles for district-wide GI planning, drawing on themes such as health and wellbeing, biodiversity, and ecosystem services.	Glasgow's Green Network Strategy has set aspirational GI targets. It aims to create: ○ An enhanced natural environment delivering secure resource availability for industry. ○ A protected natural environment that supports precious wildlife. ○ A reduced damage toll from extreme weather events. ○ An improved air and water quality, helping to reduce costs and improve health.

Outcome orientated Quantified target related to achieving GI benefits. Most frequently applied to access to greenspace, risk reduction or nature recovery.	**The West of England Combined Authority's** (WECA) Joint GI Strategy contains the following quantified outcome-oriented targets as part of its Nature Recovery ambitions: ○ Create 5,108 hectares of wildlife-rich habitat outside the protected site network by 2043. ○ Double the amount of woodland by 2060. ○ Close the connectivity gaps with 580 hectares of new native woodland and 660 hectares of new species-rich grassland by 2050. ○ Double the amount of land managed for environmental gain from 2018 levels by 2050. ○ Double the abundance of wildlife from 2018 levels by 2050.
Spatial targets	
Vision-orientated High-level schematic of GI networks, usually signposting corridors for protection or enhancement, with a broader strategic scope.	The Central Scotland Green Network (CSGN) Vision has ambitions for: ○ Delivering an integrated habitat network across the CSGN with wildlife corridors joining up important sites and habitats. ○ Making sure that every settlement in Central Scotland sits within good-quality landscape. The associated CSGN Delivery Plan 2020 - 2030 has set out targets to: ○ Increase habitat connectivity. ○ Increase the proportion of the strategic active travel network which runs through greenspaces or green corridors. ○ Increase the connectivity of the green active travel network.
Outcome-orientated Spatial prioritisation of locations for future GI interventions, based upon analysis of both strategic and local needs and opportunities. (e.g., sites for SuDS interventions in flood risk areas).	Birmingham City Council's Green Living Spaces Plan, published in 2013, was the first to undertake a comprehensive assessment of its environment using the National Ecosystem Assessment framework. The Plan draws on spatial analyses to inform its overarching strategic principles, desired outcomes, as well as implementation and funding opportunities.

To help support local ambitions and connect them to key policy hooks, strategies should outline how they can support the delivery of national objectives or international obligations via localised interventions, and subsequently reflect these in development plans and planning policy. Key targets are listed below.

1. ***"Protecting 30% of land for nature by 2030"***
   The global 30 by 30 goal is currently the centrepiece of the post-2020 Global Biodiversity Framework, which it is hoped will be adopted as part of COP15. Currently, 72 Leaders of the High Ambition Coalition for Nature and People (HAC), including the UK, announced support for the 30 by 30 goal. A joint statement adopted by the G20 in Rome 2021 also recognized the importance of protecting 30% of the planet by 2030. The UK Government has committed to introducing domestic policy to support the 30 by 30 goal.

2. ***"Reversing biodiversity decline by 2030"***
   Political leaders participating in the United Nations Summit on Biodiversity in September 2020, representing 93 countries from all regions and the European Union, have committed to reversing biodiversity loss by 2030 through the Leaders Pledge for Nature. The UK has played a key role in negotiating the Pledge, and the Environment Act 2021 includes a target to reverse biodiversity decline by 2030 *(See also Policy context).*

3. ***Ensuring all development is resilient to the impacts of climate change, maximizing the use of nature-based solutions***
   UKGBC has produced a *'sector ambition'* in consultation with the industry that: *"by 2030, all buildings and infrastructure should, throughout their lifetime, be climate resilient and maximise environmental net gains through the prioritisation of nature-based solutions."* The ambition is designed to provide a focal point for industry and a level of ambition that is both commensurate with the scale of the challenge and viable for the industry. Guidance on how to assess the resilience of developments is explored through our framework for reporting and measuring climate related physical risks.

4. ***Waterways to have excellent water quality which supports healthy wildlife"***
   Planning obligations can be used to set out requirements relating to monitoring water quality, habitat creation and maintenance, and the transfer of assets where this mitigates an impact on water quality in relation to the specific development site. Water quality can be improved by protecting and enhancing green infrastructure, (in particular wetlands and SuDS), although specific protective policy may be needed for chalk stream areas and ecology. Further information on this can be found in the planning practice guidance on the Natural Environment.

It is recommended that authorities develop robust, measurable local nature recovery and resilience targets in relevant strategies, and embed these across authority operations, functions and decision making.

Case Study: Bristol Ecological Emergency Strategy & Action Plan

In September 2020 the Mayor and One City partners agreed the One City Ecological Strategy as a co-ordinated effort to confront ecological decline. There were four goals in total.

- *30 per cent of land in Bristol would be managed for the benefit of wildlife.*
- *The use of pesticides in Bristol would be reduced by at least 50 per cent.*
- *All waterways would have excellent water quality, which supports healthy wildlife.*
- *The consumption of products that undermined the health of wildlife and ecosystems around the world would be reduced.*

In response to the strategy, the Bristol City Council Ecological Emergency Action Plan was created. This action plan is a council-wide programme of activities to deliver on the ambitions of the strategy and relevant aspects of the One City Climate Strategy.

It sets out action being taken by the council in the four years up to 2025 to embed nature into all decisions. Supported by the council, One City partners are also undertaking work to map and identify opportunities to enhance Bristol's ecological network and establish the Bristol Wildlife Index – a list of species that can be monitored, to be able to assess progress.

e) Securing delivery

To ensure that strategies and targets do not sit on the shelf, we recommend they include (or are accompanied by) a timebound implementation and action plan. This should:

- Outline a range of initial projects or opportunities for GI implementation that realise the ambitions of the strategy.
- Address how key stakeholders and collaborators will engage in the delivery of the strategy's ambitions, including measures to ensure stakeholders know how to use the strategy and how to deliver the targets. These could be online drop-in sessions or 'how to use' workshops – helping people implement the strategy in practice - and continuing engagement past publication of the strategy and/or targets.
- Earmark or signpost funding mechanisms/opportunities that support the delivery and maintenance of GI.

Establish long-term management and monitoring arrangements

How interventions, such as GI, are managed, maintained, and monitored in the long-term is critical to ensuring the value is optimised. These long-term considerations should be incorporated within an action plan, which sets out what is to be done, when, and by whom.

Determining responsibility for GI (both new and existing) can, however, be difficult, with local authorities often operating at a stretched capacity. This emphasises the need for diverse, cross-sector collaboration that considers the integral role of communities as stewards of GI.

Where possible, efforts should be made to monitor and evaluate the function and performance of GI. This data can then contribute to a growing evidence base which helps inform future strategic decision making and supports the case for further investment in GI delivery and management.

The Connecting Nature Framework Guidebook provides useful information on processes for the planning, delivery and stewardship of multi-functional NBS, as best suited to the local ecological context.

Utilise available funding mechanisms

Identifying and utilising relevant funding mechanisms will clearly be crucial for the successful delivery and maintenance of GI interventions. UKGBC has produced and contributed towards extensive guidance on various options and funding mechanisms through the following reports:

- The value of urban nature-based solutions – Includes guidance on developing finance strategies and available funding sources.
- Financing the Built Asset Adaptation Gap – Summarising discussions held at a UKGBC hosted event on behalf of the IGNITION project, with support from the Environment Agency and the Greater Manchester Combined Authority, on models, examples and the next steps for financing nature based solutions to enhance resilience.
- Investing in a Greener Greater Manchester: A nature-based solutions investment guide for local authorities – This guide outlines a range of innovative investment and management opportunities for local authorities, demonstrating the benefits and the feasibility of large scale, public-sector-led nature-based solutions delivery.
- Principles for Delivering Urban Nature-based Solutions – Includes useful tools, guidance, and options encompassing long-term maintenance plans, articulating value, and securing funding for multifunctional NBS.

The Connecting Nature 'Enterprise Platform' aims to connect different stakeholders together, including suppliers of NBS with buyers; nature-based enterprises; financers innovators and share the latest evidence and research. Further, comprehensive guidance is available through the Financing Nature's Recovery website.

Include specific species and habitat plans

A key component of BAPs has been the focus on individual species and habitats. Lists of priority habitats and species are available nationally and internationally.

With key policies, such as biodiversity net gain in England, using habitats as a proxy for biodiversity, it is crucial that strategies consider the implications for key species. Updating a Biodiversity Action Plan, and/or developing specific species and habitat plans, can therefore be a valuable exercise in developing the relevant evidence base to inform subsequent policy and strategic nature recovery priorities, or as part of Local Nature Recovery Strategy to ensure interventions support priority species.

Achieving species and habitat-specific goals will clearly require supportive monitoring capacity and data collection. Local Environmental Records Centres, environmental charities and species groups can help provide essential information.

Guidelines for developing species-specific targets and habitat plans include:

- **Maintaining and increasing species distribution** - This can be based on known locations and sighting data.
- **Increasing key species populations** - This requires the associated data and monitoring capacity, e.g. in partnership with Local Environmental Records Centres.
- **Prioritizing the delivery of key habitats in authority land management and policy -** Supporting integrated and holistic green/blue Infrastructure solutions in new developments, for example, wildflower areas in parks and on road verges, wetland with which to support Species richness in adjacent areas, native hedgerows in new development, reducing light pollution, promoting habitat connectivity, specific species-based provisions as conditions for new development e.g., bat boxes, swift bricks.
- **Enhancing the water quality of key local water bodies.**
- **Ensuring Local Wildlife Sites are in a state of "positive conservation management".** DEFRA considers those sites in "positive conservation management" to be those LWSs that: have a Site Management Plan; are under an Environmental Management Schemes (such as Higher Level Stewardship); where there is a written record that conservation work has taken place; or where a record was made where a landowner of a LWS had received management guidance or advice in the last 5 years and whether it was known if this was acted on.
- **Updating or reviewing Nature Improvement / Biodiversity Opportunity Areas.**

Case Study: Scottish Borders Local Biodiversity Action Plan

The Scottish Borders Local Biodiversity Action Plan (LBAP) provides a framework for the delivery of biodiversity enhancement for the Scottish Borders from 2018-2028. The updated LBAP takes into account changes in national policy.

The six key themes for nature that the LBAP actions are based around are:

1. Ecosystem Restoration
2. Investment in Natural Capital
3. Quality greenspace for health and education benefits
4. Conserving wildlife in Scotland
5. Sustainable management of land and freshwater
6. Sustainable management of marine and coastal ecosystems

To guide the delivery of the LBAP, more detailed **Habitat Action Plans** have been produced which have a main objective to create linked integrated habitats in a network across the Borders. The next phase of the LBAP implementation will focus on developing an ecosystem approach to help ensure functioning woodland, wetland, grassland, heathland, marine, and other ecosystems can develop.

Useful examples:

Northern Ireland:

- **Fermanagh and Omagh District Council's Draft Biodiversity Strategy and Action Plan 2022-2027**
- **Mid and East Antrim Local Biodiversity Action Plan**
- **Newry Mourne and Down Local Biodiversity Action Plan: 2018-2022**
- **All-Ireland Pollinator Plan**

- **Derry City and Strabane District Council (DCSDC)** GI Plan

Scotland:

- **Highland Nature** Biodiversity Action Plan: 2021 - 2026
- **North Ayrshire** Local Biodiversity Action Plan 2019-31
- **Edinburgh's** Biodiversity Action Plan 2019-2021
- **Stirling Council's** Adaptation Strategy
- **Edinburgh** Adapts **-** inc. the Resilient Edinburgh Climate Change Adaptation Framework, Action plan and Vision

Wales:

- **Newport City Council's** Local Biodiversity Action Plan
- **Powys** Biodiversity Action Plan
- **Cardiff Council's** Local Biodiversity Action Plan
- **Merthyr Tydfil's** Nature Recovery Action Plan 2019-2024

England:

- Kent Nature Partnership Biodiversity Strategy 2020 to 2045
- **Action for Nature:** A Strategic Approach to Biodiversity, Habitat and the Local Environment for Leicestershire County Council
- **Cambridge** Biodiversity Strategy 2021-2030
- Cornwall's Biodiversity Action Plan
- Hertfordshire Climate Change and Sustainability Partnership Strategic Action Plan for Biodiversity
- **Wiltshire Council** Climate Change Adaptation Action Plan
- **Cambridge City Council** Climate Change Adaptation Plan
- Hull Climate Adaptation Strategy
- Essex Climate Action Commission Net Zero: Making Essex Carbon Neutral

Other:

For adaptation strategies, **Local Partnerships** have produced a **toolkit** which can be used as a walkthrough to aid the development of an adaptation strategy, or to help embed adaptation into other strategies.

A list of existing tree strategies has been compiled by **The Tree Council**.

The Connecting Nature Framework Guidebook is a toolkit to support delivery and stewardship planning of nature-based solutions on a large scale in cities and communities.

The Nature and Resilience Playbook

Part 2 – Strategic and spatial planning

Section Contents

Summary of recommendations

I. Introduction
II. Strategic & spatial planning principles
III. Spatial development planning
IV. Neighbourhood and community planning

-> Previous section: Part 1: Strategies and Target Setting

-> Next section: Part 3: Development management, standards and policy

Summary of recommendations

Recommendation 1: Strategic plans, frameworks, strategies, and partnerships should embed and promote a clear, strategic approach to biodiversity enhancement and climate resilience

Strategic plans, frameworks and/or strategies should:

1. *Ensure nature recovery and climate resilience goals are upfront as part of any shared priorities and objectives [or a part of a memorandum of understanding].*
2. *Draw together, and embed, existing environmental strategies and socio-economic [through a common, joint framework].*
3. *Utilise, and reflect, extensive spatial data, including wider GIS data.*
4. *Prioritise supportive resilient transport and infrastructure solutions.*
5. *Plan for nature restoration and resilience at scale.*

Recommendation 2: Spatial planning, strategic policies, and site allocations should ensure development is directed towards sustainable locations, and strategic environmental initiatives are safeguarded

In addition to the above, site allocations and spatial planning policies should:

1. *Deploy extensive climate-risk and biodiversity evidence to inform strategic allocations and associated policies, including to ensure:*
   - *A. Development is steered away from current and future areas of flood risk, localised overheating, and coastal erosion, prioritising avoidance over mitigation and management*
   - *B. Land needed for future flood risk management infrastructure is safeguarded. Opportunities should be taken to reduce overall flood risk through natural flood management.*
   - *C. Developer contributions are targeted towards appropriate flood and coastal risk management infrastructure.*
   - *D. Multi-functional green infrastructure benefits, including for biodiversity, are maximised. Considering the effect of development sites on local biodiversity, the capacity of biodiversity to adapt to climate change, and associated biodiversity restoration opportunities at scale.*
   - *E. The implications and opportunities of the site for the resilience the existing communities is considered, including through active water management, and sustainable drainage systems*
   - *F. Adopt a reasonable 'worst-case 'climate impact scenario*.*
2. *Develop strategic, multifunctional GI priorities, networks and policies.*

**'reasonable' action is dependent on the locally specific degree of risk*

Recommendation 3: Neighbourhood and community planning must support ambitious local action on nature and resilience

Neighbourhood and community plans should be encouraged and supported to follow best-practise examples and guidance on applicable biodiversity and resilience measures that can be delivered locally.

I. Introduction

Securing nature's recovery and climate resilience, alongside wider socio-economic objectives, requires substantive consideration at both a strategic and spatial level. Cross-boundary and wider stakeholder cooperation will be especially critical in order to coordinate long-term sustainable development with nature's recovery and key service provision.

In England, strategic planning was done predominantly through Regional Strategies. These were plans which covered multiple local planning authority areas and imposed certain requirements on the local communities within those areas, (e.g., the number of new houses they would need to accommodate). However, the Westminster Government abolished this regional planning tier through the Localism Act 2011 in England. A '**Duty to Cooperate'** was introduced to ensure that local planning authorities and other public bodies would work together in relation to the planning of sustainable development that extends beyond their own administrative boundaries. Local planning authorities must demonstrate their compliance with the *Duty to Cooperate* when their Local Plan is examined.

Mayoral-led and combined authorities, where devolution agreements permit, produce Spatial Development Strategies. Whereas local councils draw up Local Plans, decide planning applications and can work with other councils to prepare Joint Strategic Plans (Oxfordshire, South Essex, Southwest Herts) and non-statutory strategic spatial frameworks (Cambridgeshire and Peterborough).

In Scotland, there are four Strategic Development Plan Areas which cover Scotland's largest city-regions around Aberdeen, Dundee, Edinburgh and Glasgow. Following the 2019 Planning (Scotland) Act, the statutory duty to prepare a Strategic Development Plan was removed and replaced with a duty to prepare a Regional Spatial Strategy. This duty, which applies to all local planning authorities in Scotland, not just the current 4 SDPA's, will formally come in force following the approval of National Planning Framework. Unlike the Strategic Development Plan, the Regional Spatial Strategy will not form part of the statutory Development Plan system, which will now comprise the National Planning Framework and the Local Development Plan. Details of the legislative requirements in relation to Regional Spatial Strategies can be found here.

In 2020, the **Welsh Government** held a consultation on plans for the legislation required to establish the procedure for Strategic Development Plans (SDPs) to be prepared across Wales. Wales' four regions (North; Mid Wales; South East; South West) will have to produce SDPs to co-ordinate and manage development across each region with the key stages and prepare requirements mirroring those in LDP Regulations. Future Wales is the national spatial strategy for Wales, setting national objectives and promoting a broad spatial strategy to achieve them.

Responsibility for planning in **Northern Ireland** is shared between the 11 local councils and the Department for Infrastructure, with councils producing local development plans.

ii. Strategic & spatial planning principles

Strategic planning seeks to promote a coordinated response across wide geographical areas like city regions, and across multiple sectors including housing, transport, health, and the environment.

The scale of strategic planning makes it especially important for securing biodiversity recovery and climate resilience at scale, alongside delivering long-term sustainable development. Cross-boundary cooperation is increasingly important for addressing issues and delivering solutions to issues that do not correspond to jurisdictional boundaries, and can involve wider landscape or regional areas, such as catchment areas or local ecosystem recovery.

Much of the process for developing a **strategic plan, framework or strategy** resembles the themes outlined in section one. However, in order ensure that both climate resilience and nature's recovery are central to strategic planning, in addition to legal obligations such as under habitat regulations, the following principles are recommended.

1. Ensure nature recovery and climate resilience goals are upfront as part of any shared priorities and objectives
[or a part of a memorandum of understanding]

2. Draw together, and embed, existing environmental strategies [through a common, joint framework]

3. Utilize, and embed, extensive spatial data

4. Prioritise supportive resilient transport and infrastructure solutions

5. Plan for nature restoration and resilience at scale

Principles 2-5 are also clearly relevant to local spatial development planning. Both local development plans, and cross-boundary spatial development plans (where applicable) should reflect these principles in spatial allocations and associated strategic policies. Further guidance on **spatial planning policy** is provided in the next subsection, including on:

1. Deploying climate-risk and biodiversity evidence to inform strategic allocations and associated policies

2. Developing strategic, multifunctional GI priorities, networks and policies

Ensure nature recovery and climate resilience goals are upfront as shared priorities, objectives, or as part of a memorandum of understanding

To successfully prepare a joint strategy, framework or plan, many local authorities have produced variations of a *'joint expression of common ground'* to act as the basis for the subsequent plan. It is vital that biodiversity recovery and climate resilience goals are a central feature of any joint memorandum or vision for a development plan.

A key lesson from joint spatial initiatives such as the Ox-Cam Arc (below) is that, although housing provision may be an important element of a joint spatial framework, it is critical for success that ambitious environmental objectives are both featured and communicated prominently. This will ensure development maximises the opportunities for achieving sustainability benefits and avoids exacerbating existing problems.

Case Study: Ox-Cam Arc

At the Budget 2020, the government committed to developing, with local partners, a Spatial Framework for the Oxford-Cambridge Arc – the area that spans the five ceremonial counties of Oxfordshire, Northamptonshire, Buckinghamshire, Bedfordshire and Cambridgeshire: 31 local authorities, 4 Local Enterprise Partnerships.

Given the environmental sensitivities of the area, and the scale of partnership, specific shared regional principles for protecting, restoring and enhancing the environment were developed by local leaders based on work done by NGOs through the **'Nature's Arc Partnership**. These principles included the aim to encourage local partners to exceed minimum standards required by building regulations on issues such as water consumption and highlighted a commitment to working with Government on these issues. The Government has not yet said that it will support or help local leaders to deliver on these ambitions.

In February 2021, the policy paper 'Planning for sustainable growth in the Oxford-Cambridge Arc: spatial framework' set out the government's planned approach to developing the Oxford-Cambridge Arc Spatial Framework, including a timeline for delivery, its high-level scope, and how it would work with local partners. In March 2021 a joint declaration was published by government and local partners on the overarching ambition for the Arc, covering 4 key thematic areas: productivity; placemaking, connectivity and environment.

In July-October 2021, 'Creating a Vision for the Oxford-Cambridge Arc', was launched as the first public consultation on the Spatial Framework. Alongside development and infrastructure priorities, the Spatial Framework planned to identify *Environmental Opportunity Areas*, including water services infrastructure incorporating nature-based solutions, supporting nature recovery, biodiversity net gain and carbon sinks.

This would build on evidence baseline identified in the Local Natural Capital Plan. An accompanying Sustainability Appraisal aimed to address environmental issues alongside social and economic concerns. An initial Sustainability Appraisal Scoping Report covered key areas including biodiversity, water and air quality, landscape and land use, climate change, transport and infrastructure.

The Government also aimed to work with local partners to create an accessible digital platform for economic, planning and environmental data, and easy-to-use tools so that people – including the public and businesses – could engage meaningfully in the process. The Spatial Framework would be visual and map-based, standardised.

To ensure local coordination across the Arc, governance included:

- An Arc Leaders Group of local authority Leaders and Local Enterprise Partnerships (LEPs) Chairs.
- An independent Business Chair and Advisory group.
- An Arc Chief Executives Group of local authority and LEP chief executives.
- Thematic groups on different policy pillars including LEPs, LAs and universities.

Case Study: Surrey Place Ambition

Surrey's 2050 Place Ambition presents the long-term ambitions and priorities for Surrey local authorities and their strategic partners. The priorities and implementation framework sets out a growth framework for the next 30 years, aligning long term spatial, infrastructure, environment and economic priorities across local authorities and other public sector agencies.

The Place Ambition has been developed by the Surrey Future partnership and is informed by and will be implemented through various local and countywide plans and strategies, including district and borough local plans, climate change strategies, economic strategies, and the local transport plan. It does not replace any local proposals and priorities but is intended to promote a long term, co-ordinated and cross boundary approach to planning and managing the impacts of growth. The Place Ambition will be used to help shape projects as well as seek the support of wider sub-national partners and Government, particularly in relation to accessing additional funding and investment opportunities for infrastructure and to support a zero-carbon future.

The emerging Place Ambition Spatial Framework and supporting Implementation Framework underwent a consultation running until 4 March 2022. An accompanying Surrey Development Forum brings together key stakeholders including the county council districts, boroughs and developers to identify and address strategic issues, share best practice and to facilitate collaborative thinking.

Draw together, and embed, existing environmental strategies

As outlined in section 1, there are already many spatial instruments and plans related to the environment. However, these are often siloed and separate from local development plans, meaning that the environmental dimension is often introduced late as a source of conflict, rather than giving developers and others strategic predictability. Strategic frameworks, development plans and strategies offer an opportunity to draw in strategies outlined in section 1, and connect these to development priorities, management policies (where applicable) and wider strategic land management through shared a framework.

Case Study: West of England Combined Authority Joint GI Strategy (WEGIS)

The joint GI strategy outlines a multi - beneficial approach to GI strategy, policy and delivery aiming to utilise education, embed a natural capital focus, promote collaboration between public and private bodies, promote public awareness, in order to secure financial investment and use an evidence-based approach to monitor progress.

The Strategy is owned by all 5 local authorities and the product of a joint working group. It is intended to facilitate action and investment by:

- Providing key concepts and tools to enable a consistent approach to GI across the West of England, including developing planning policy guidance and the GI Policy Assessment Matrix.

- Promoting the development and use of a GI shared evidence base for Local Plan development and other joint or local plans and strategies, and the development of projects/business cases, to contribute to GI enhancement, including mapped data to support the GI Outcomes.
- Setting out the role and the current extent of the existing GI network, and identifying both issues and new opportunities for enhancement.
- Recognising the need to prioritise the planning, development of investment in, and monitoring of GI as part of the response to the climate and ecological emergencies, and to new duties including Biodiversity Net Gain and the delivery of Local Nature Recovery Strategies.
- Highlighting the means by which organisations, communities and partnerships can work collectively to create and sustain a fit for purpose GI network across the West of England.
- Providing a prospectus for partners to develop projects to enhance and extend the GI network.

The Strategy identifies: Outcomes, Principles and an Action Plan including priority activities to achieve the Outcomes. Some are joint activities or projects and others will be delivered by individual partners e.g. Unitary Authorities as they progress their Local Plans and climate emergency action plans. Progress will be monitored through an annual review process by the West of England working group comprising four Unitary Authorities; amending and creating new actions where necessary in line with national legislation.

Case Study: Greater Manchester - Places for Everyone, a strategy for housing, jobs and the environment

The Places for Everyone strategy is the strategic spatial plan for Greater Manchester and sets out the planning policy framework for the whole of the city-region. It aims to create a long-term vision for all nine districts of Greater Manchester until 2037.

The plan aims to achieve 10 objectives, including improving both the quality and quantity of accessible green spaces and having a positive impact on the natural environment and the health and wellbeing of local residents. As well as covering both housing and infrastructure priorities and policies, the strategy seeks to identify the important environmental assets across the conurbation which will be protected.

The strategy draws together significant evidence base, including the Local Industrial Strategy, the GM Strategic Green Infrastructure Network, GM's Local Nature Recovery Network pilot, the Manchester Transport Strategy 2040, the Five-Year Transport Delivery Plan (and local implementation plans). The final draft was submitted to the Secretary of State on February 14th, 2022.

Utilise, and reflect, extensive spatial data

In common with strategies outlined in section one, strategic level plans should draw on, and integrate extensive adaptation and biodiversity data sets, as well as existing spatial and GIS data related to key, interrelated service provision. Where these do not exist, or are inadequate, developing strategic planning frameworks also provides an opportunity for sharing of costs through jointly commissioning evidence bases, which can then also be used the preparation of local plans.

Areas such as South Hampshire through the Partnership for South Hampshire (formerly Partnership for Urban South Hampshire) have a history of jointly produced evidence bases.

Case Study: London GLA Triple jeopardy mapping

Complimentary to the London plan, the Triple Jeopardy Map (TJM) developed by the EPSRC in collaboration with UCL and a number of partner organisations, geographically maps the degree of individual vulnerability to heat stress across the UK Populus focusing on London and the West Midlands.

This digital resource was created to consider the direct implications rising temperatures will have on human health across a diversity of dwelling types. A localised prediction of heat-related illness and mortality is calculated using three different data sets: UK demographic data (including factors of age, health and isolation), a detailed assessment of infrastructure characteristics and historical Urban Heat Island temperatures. The website presents a series of chromic maps constructed with GIS technology, in conjunction with an explanatory document, and the original source data.

Supporting documents detail the Importance of Infrastructure design in relation to the likelihood of fatality or ill health, factored into the mapping data itself. The TJM model points to a number of empirical studies, identifying a buildings fabric, level of retrofit, height and ventilation just few of the many factors which Influence risk levels.

This data not only aims to illuminate the severity of overheating risk, but the spatial inequality of vulnerability across London's landscape to ensure action is directed to those most in need. In the long term, UCL researchers hope the data can be used by local authorities and councils to assist the evaluation of risk and implement specific mitigation strategies.

Case Study: The Keep Bristol Cool mapping tool

Though similar in functionality to London's Triple Jeopardy map, The Keep Bristol Cool mapping tool uses use four different vulnerability layers; age, deprivation, outdoor exposure and local environment, whilst factoring different extreme future trends at varying time projections. The interactive map is composed of a total of 34 factors each with different weightings depending on the specific degree of physical environment risk.

Prioritise supportive, resilient transport and infrastructure solutions

Infrastructure considerations and existing limitations are already important in the inspection and sustainability appraisal processes and can often form the basis for rejection or delays. Although authorities currently produce Infrastructure Delivery Plans, these can vary in quality and often do not reflect 'live' cumulative infrastructure capacity.[5] Without considering sustainable infrastructure solutions, nature recovery and resilience goals can be fundamentally undermined through habitat fragmentation, 'lock-in' or a lack of long-term resilience. Attention to climate resilience pressures is likely to rise considerably in the coming decades.

Interactive web-based infrastructure mapping tools, that overlay current and future infrastructure investment data together with key climate resilience considerations, alongside existing GIS and spatial data, are a key means to deliver sustainable growth alongside resilient infrastructure networks, by

[5] RTPI, "Planning for Critical Infrastructure in London", https://www.rtpi.org.uk/media/7154/rtpi-planning-for-critical-infrastructure-in-london-november-2020.pdf

helping to understand and consider interdependencies. Likewise **Strategic infrastructure plans** produced by county, combined and unitary authorities, often in partnership with LEPs, offer a useful model for addressing these issues as part of a comprehensive evidence base.

Case Study: London Infrastructure Mapping Application (IMA)

The London Infrastructure Mapping Application (IMA) is an interactive web-based mapping tool that displays growth and development data, future infrastructure investment data, and contextual information relating to growth and infrastructure in Greater London.

Key Features

- A Collaboration Tool: This tool automatically identifies streetworks schemes which overlap in space and time.
- Probability of Development: The IMA models and visualises the likelihood of residential construction projects to be delivered as expected by a specified date.
- Dormant Sites Filter: The IMA can filter out residential projects that haven't completed a new unit for a specified number of years.
- Area Summarisation and Data Visualisation: The IMA can summarise the scale, scope and status of infrastructure and construction projects happening in a specified area to build understanding and improve usability.

The IMA has 25,000 data points and over 50 context layers which are regularly updated as we incorporate new datasets sourced directly from industry and public sector partners.

The data in the IMA broadly falls into three categories.

- Future infrastructure investment data, from six months to 30 years into the future. There is an understanding among users that this data is inherently speculative.
- Growth and development data from the Planning London Datahub (PLD)
- Relevant contextual data

This includes Flood Zone 3 (2017) data and current water infrastructure projects.

Case Study: Greater Manchester Infrastructure Framework 2040

Greater Manchester combined authority have worked with infrastructure providers to produce an Infrastructure Framework 2040. This framework covers the following physical infrastructure elements broadly in line with the remit of the National Infrastructure Commission, these are: Transport, Energy, Water and Wastewater, Flood Risk Management, Digital Communications, Green and Blue infrastructure.

The Infrastructure Framework is a precursor to the development of the Greater Manchester Infrastructure Strategy. It looks to frame the key issues and priorities which the Infrastructure Strategy should seek to address and sets out: the key trends affecting Greater Manchester's infrastructure to 2040; how those trends will affect each infrastructure network; and the eleven challenges that will have to be overcome through a series of 'responses'. To oversee the Strategy, a new Strategic Infrastructure Board has been created.

Case Study: Norfolk Strategic Infrastructure Delivery Plan

This strategic infrastructure delivery plan (NSIDP) pulls together information on the key infrastructure needed to deliver economic growth in Norfolk. It is a working document, reviewed on a regular basis as information becomes available and projects progress through to delivery. The Plan aims to help NCC and partners to co-ordinate implementation, prioritise activity and respond to any funding opportunities. The SIDP supports the environmental policy commitment to achieve 'net zero' emissions on council estates by 2030 and wider work towards regional 'carbon neutrality', by 2030.

This list is compiled in collaboration with stakeholders including internal county council departments, district councils, utility companies and government agencies. Projects align with the County Council's priority for improved infrastructure, the ambitions of the Norfolk and Suffolk Economic Strategy (NSES), Local Industrial Strategy, District Council Local Plans, the County Council's plan "Together for Norfolk – an ambitious plan for our County 2019-2025" priorities, and Investment Plan and the Norfolk Strategic Planning Framework agreed by all Norfolk planning authorities.

The NSIDP includes the most strategic level projects on which the county council alongside partners are actively working to progress and which have a recognised route towards delivery. All the projects will deliver the physical infrastructure that is essential to promote key economic and development growth locations. Sitting alongside the NSIDP, there are more detailed work streams generating projects in areas such as sustainability, renewable energy and green economy. The details of some of these projects can be found in proposed works supporting the Norfolk County Council's Environmental Policy and Norfolk Strategic Planning Framework amongst others.

Plan for nature restoration and resilience at scale

To restore nature and deliver resilient development at scale clearly requires a joined-up approach to strategic and spatial planning, ensuring key resilience and nature restoration opportunities are thoroughly integrated into strategic planning alongside development and economic opportunities. As outlined by the **Third Climate Change Risk Assessment**, **restoring ecosystem health and biodiversity at scale** is will be essential for delivering local climate resilience and addressing several priority risk areas and vulnerabilities.[6]

The UK Government's Flood and coastal erosion risk management Policy Statement (2020) aims to promote a more integrated approach to water management by drawing together different local strategies, initiatives and plans to maximise the mutual benefits for community resilience and wider objectives, such as nature recovery and sustainable water management. It includes the aim of supporting the use of nature-based solutions and natural processes to support both climate resilience and nature recovery, through encouraging a catchment-based approach.

Recommendations to improve landscape-level resilience to wildfires, through improving ecological resilience and habitat condition, have likewise been made by the National Fire Chiefs Council and Natural England.

[6] https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/

Strategic plans must seek to maximise the opportunities for nature restoration and securing both ecological and climate resilience at scale, through identifying key environmental opportunities areas (such as through local nature recovery networks) to be enhanced and protected. Further detail of how to reflect this in spatial policy is developed in the next section, but key strategic principles and useful processes are outlined below.

Water Resources East: Systematic Conservation Planning

Water Resources East is working with Biodiversity and WWF – UK to develop a natural capital plan for Eastern England. This plan will be stakeholder led and will seek to identify where natural capital action should be prioritised across the landscape in order to deliver outcomes for nature, water and society. The project will also feed into the water resource management plans that WRE will be developing and help make sure that the changes in water management directly support the recovery of nature.

The plan will be developed using **Systematic Conservation Planning (SCP)** a combination of a social process and a prioritisation analysis. The Spatial prioritisation analysis identifies how and where to act to improve natural capital in the most cost-effective manner within a social process facilitating an inclusive dialogue to give stakeholders ownership over the plans.

This plan will identify priority areas across the WRE region where actions should take place to achieve natural capital objectives set by stakeholders. This plan will be designed to inform and coordinate on-the-ground action delivered by government bodies, environmental organisations, it has no legal or statutory status.

GREENPASS

GREENPASS is a tool for evaluation, optimization and certification of climate-resilient urban planning and architecture. It provides tools for the urban planning process for new developments or retrofit – on building plot, district or entire city level. The simulation-based solution (powered by ENVImet) considers more than 50 KPIs within 6 urban challenges: Climate; Water; Air; Biodiversity; Energy & cost – to optimize cost & benefit efficiency of building; Vegetation & materials for climate resilient urban planning & architecture.

Policysupport.org

Policysupport.org consists of a suite of tools to provide holistic spatial evidence in development decision making. Co$tingNature, WaterWorld and EcoActuary are spatial policy support systems that bring together spatial data in web based spatial policy support systems to help understand:

- The impact of development on Nature and of Nature on development (Co$tingNature).
- The impact of development on Water resources and water risk (WaterWorld).
- The impact of development and climate change on flood risk (EcoActuary).

FreeStation is a suite of designs for self-build low-cost internet-of-things monitoring devices and associated build, maintenance, and deployment guides for monitoring the effectiveness of nature-based solutions at spatial or temporal scales too fine – or situations too complex – for modelling.

Together, this suite of tools aims to reduce technical and financial barriers to use of rigorous spatial evidence in development decision making.

Key spatial **principles** for delivering resilient ecosystem networks to support nature's recovery and wider climate resilience benefits, include the following. For more detail see **Natural England's Nature Networks Evidence Handbook** and Nature Networks - a summary for practitioners (NERR082).

Principles	Explanation:
Establish natural Corridors	Nature corridors should aim to use and follow natural landscape features, with supporting habitats in core sites, and being at least 100m wide.
Support Stepping stones and the permeability matrix	For poorly dispersing species, sites should be less than one kilometre from each other and less than 200 metres apart for highly specialised species. Cover of semi-natural habitat in a landscape should be at least 20% and the intensity of land use around such habitats should be reduced.
Site size and connectivity	Larger, heterogeneous sites with good connectivity are preferable to many smaller sites. Habitat fragments should be connected to prioritise creating biggest possible sites, reducing edge effects by reducing the edge area ratio, networks should large enough to encourage natural process and ensure functioning ecosystems. Sites should aim for greater than 40 or 100 hectares for wide-ranging species. networks and protections should target areas of: • Unprotected irreplaceable habitat or areas with long ecological continuity of unintensive Land Management. • Areas with complex topography and geo morphology with the potential to be climate change refugia. • Mosaic habitats and ecosystem dynamism.
Site quality	Support natural processes, diverse habitat niches and ecosystem inc. the introduction and protection of keystone species to restore natural processes. 'Buffer zones' of at least 50-100 metres, up to 500 metres, should be considered to key vulnerable sites.

More information from the recent English **nature recovery network pilots** is available here.

iii. Spatial Development Planning

Local planning authorities across the UK all produce some form of local, spatial development plan. In particular, the principles and policies underpinning site selection and land allocation at the plan-making stage are vital for complying with legal duties to take biodiversity and adaptation into account.

A successful approach to local spatial planning will clearly build on and reflect (at local level) many of the **key strategic planning principles** outlined above and use sufficiently, strongly worded policies to ensure consistent prioritisation.

GI, Nature Recovery, BNG and Climate resilience must not be just seen as individual policies but covered within a breadth of policies that recognise the multifunctional benefits across a number of Local Plan themes/areas. This section sets out additional, broad local spatial planning criteria, which can be used to suitability assess site allocation, and inform the local plan making process.

1. Deploying climate-risk and biodiversity evidence to inform strategic allocations and associated policies

2. Developing multifunctional strategic GI priorities, networks, and policies

Deploying climate-risk and biodiversity evidence to inform strategic allocations and associated policies

In developing spatial policies and determining strategic allocations, the following principles should be adopted and translated into policy:

A. Development is steered away from current and future areas of flood risk, localised overheating, and coastal erosion, prioritising avoidance over mitigation and management.

B. Land needed for future flood risk management infrastructure is safeguarded. Opportunities should be taken to reduce overall flood risk through natural flood management.

C. Developer contributions are targeted towards appropriate flood and coastal risk management infrastructure.

D. Maximise multi-functional green infrastructure benefits, including for biodiversity. Consider the effect of development site on local biodiversity, the capacity of biodiversity to adapt to climate change, and associated biodiversity restoration opportunities at scale.

E. Consider the implications and opportunities of the site for the resilience of the existing community, including through active water management and sustainable drainage systems

In line with recent principles in national planning policy guidance, strategic policy making, including the assessment of, and approach to, key climate risks such as flooding, should follow the hierarchy of: **avoid, control, mitigate, and manage residual risk**.

Evidence on climate change risk and biodiversity is dynamic, as risks and vulnerabilities will change over time, such as flooding and sea level rise. It is therefore vital that planners are aware of regular updates to the climate science and biodiversity indicators.

F. Adopt a reasonable 'worst-case' scenario

Local authorities should plan on the basis of reasonable 'worse-case scenarios' for climate risk in relation to spatial planning, in line with the science set out in the UK Climate Projections and latest

UK Climate Risk Assessment. Specifically, local planning authorities should use 'credible maximum climate change scenarios such as 'High++' when considering particularly vulnerable locations or sensitive development (see the *evidence base* below).

Local development plans should take a long-term view of how the local planning authority area will be planned over the long term (most datasets go up to 2080 - 2100) to adapt to the opportunities and impacts arising from climate change.

G. Maximize social value, inclusivity & just transition

Levels of vulnerability to the impacts of climate change and access to nature vary across the UK, and there is substantial evidence that more socially disadvantaged communities are more vulnerable to the impacts of climate change and lack green infrastructure. Ensuring spatial planning decisions do not perpetuate, create, or worsen differential climate risks and inequalities is vital. Considering inequalities, inclusivity and differential risks will be a key component of the UK's Third National Adaptation Programme.

Applying a social value lens can ensure new development planning supports environmental, economic and social wellbeing, and in doing so improves the quality of life of people in the area. The concept has gained significant traction across the industry, particularly in the wake of national legislation[7] and plans to integrate it into new areas of local authority decision making, such as planning. UKGBC has produced extensive guidance for developers and local authorities considering social value here, outlining how to meaningfully engage with local communities.

Climate Just resources also provide a way of mapping the relationship between social exclusion and the impacts of climate change. Further information on incorporating the concept of climate justice into planning is given in the RTPI's Five Reasons for Climate Justice in Spatial Planning. Key social datasets such as the **Index of Multiple Deprivation** (IMD) should be considered and integrated alongside climate risks.

H. Deliver best practice through existing processes

Several existing procedures and processes currently apply to the local spatial planning process, which offer some opportunities to consider and address the biodiversity and adaptation implications.

- Current equivalent legislation across all UK nations requires a local planning authority to carry out a sustainability appraisal of each of the proposals in a plan during its preparation. Sustainability appraisals incorporate the requirements of the **Environmental Assessment of Plans and Programmes Regulations 2004** (commonly referred to as the 'Strategic Environmental Assessment Regulations'). This ensures that potential environmental effects are given full consideration alongside social and economic issues. The **Strategic Environmental Assessment Regulations requirements checklist** is available here.
- Strategic environmental assessment alone can be required in some limited situations where sustainability appraisal is not needed. This is usually only where either neighbourhood plans or supplementary planning documents could have significant environmental effects. A plan or project may also require an appropriate assessment, as set out in the Conservation of Habitats and Species Regulations 2017 (as amended) if it is considered likely to have significant effects on a habitats site. Further guidance is available here.

[7] England, Public Services (Social Value) Act 2012; Wales, 2015 Wellbeing of Future Generations Act; Scotland 2014 Procurement Reform Act

- National regulations also set out the requirements of **an Environmental Impact Assessment (EIA).** The EIA process must be undertaken for **projects** which are likely to have a significant-impact on the environment. An important addition to the 2017 Regulations was inclusion of climate change mitigation and adaptation considerations within the EIA process. For more information and guidance on incorporating climate resilience and adaptation within the EIA process, see the IEMA EIA Guide to Climate Change Resilience and Adaptation.
  Further guidance on integrating climate change resilience and biodiversity into EIA and SEA can be found in the European Commission's Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment. At the time of writing, the UK government has pledged to review and consolidate the EIA and SEA processes across England, with no comparable changes planned in Scotland, Wales and NI.

To help realise and implement these approaches, in addition to the resources outlined in Section 1, the following tools, guidance, strategies and resources should be used or consulted:

Flooding	
All	**Environment agencies** also provide advice on the handling of dynamic risks such as climate change (flood risk) allowances (also known as flood risk allowances) as well as information on planned capital investment in flood risk management infrastructure. • **Flood risk management plans** (FRMPS) - Cover the risk of flooding from: rivers, the sea, surface water and groundwater reservoirs. Each FRMP covers a specific river basin district (RBD). FRMPs must be reviewed by the Lead Local Flood Authorities and relevant Agency every 6 years. • **River basin management plans** (RBMPs) provide a framework for achieving an improved and sustainable water environment for each River basin districts. RBMPs and FRMPs together provide an integrated approach to catchment planning for water. Public bodies in England and Wales have a duty to have regard for RBMPS Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. • **Drainage and wastewater management plans** - Are due to be produced by water and sewerage companies in England and Wales in line with the new **technical framework**.
England	EA provides a number of flood risk modelling products that can help in assessing current and future flood risk, including the flood map for planning and long term flood risk checking. **Lead Local Flood Authorities** will have mapping on Surface water flooding and critical drainage. Many have mapping of locations for SuDS schemes that have been delivered through nature-based solutions/ natural flood management that can be enhanced. **Surface water management plans** **(SWMPs)** are non-statutory plans which can be used to look at existing problems and to inform planning decisions for new development. In particular they can provide an important evidence base for the development of local flood risk management strategies. **Local flood risk management strategies** **(LFRMS)** - Lead local flood authorities in England must develop local strategies for flood and coastal erosion risk management. These must be consistent with the national flood and coastal erosion risk management (FCERM) strategy.

Wales	Technical advice note 15 (TAN 15) and Flood Map for Planning will be implemented from 1 June 2023.
Scotland	The Scottish Government outlines specific flood risk management responsibilities, supplemented by step by step guidance for statutory bodies and local service providers, on flooding protection procedures, clearance/repair strategies and surface water flooding management for local authorities.
	The Interactive Flood Risk Management Strategies map details regionally specific flood risks, agreed goals or objectives and a summary of bespoke mitigation actions.
NI	Interactive map-viewer displays the estimated degree of localised flood risk. The map comprises of two elements; the 'Indicative Flood Maps' (using historical flood data to assess future flood risk) and EU standardised flood Hazard Maps (describing the physical characteristics of potential flooding).

Water use

All	Water cycle studies - are voluntary studies that use water and planning evidence to understand environmental and infrastructure capacity. They can identify cost-effective solution that are resilient to climate change for the lifetime of associated development. Water cycle studies provides evidence for plans and sustainability appraisals ideally at an early stage of plan-making. Local authorities (or groups of local authorities) can lead water cycle studies to provide evidence for sound plans.
England	The English national framework identifies the strategic water needs for England and its regions across all sectors up to and beyond 2050. The latest associated regional plans across the five areas can be found: • **Water Resources North** - Emerging Plan consultation • **Water Resources West** - Information on the Emerging regional plan; latest news • **Water Resources East** - Information on the Emerging regional plan; latest updates. • **Water Resources South East** - Information on the Emerging regional plan the consultation document; Consultation Response Document; latest updates. • **West Country Water Resources** - Emerging Plan Consultation The Environment Agency's review of England's emerging regional water resources plans can be found here. The draft final regional plans will be consulted on in autumn 2022.
	Water Resource Management and Drought Plans (water companies) Environment Agency (ENG) area drought plans (available on request)**; England** Drought management Framework **;** Water situation reports for England
	Water stress zones Although they cannot currently be used for purposes such as development planning or water resources planning, local authorities can use the water stress determination to inform whether they can require the tighter standard of 110 litres per head per day in new developments. In 2021 The Secretary of State accepted the Environment Agency's advice on the water company areas that should be determined as in 'serious water stress' available here.
Wales	Water Resources Wales national drought plans, polices, and water company drought plan technical guidance

Coastal erosion

All	The Coastal Risk Screening Tool by Climate Central can also be used to identify areas threatened be sea level rise and coastal flooding.
England and Wales	**Shoreline management plans** - Shoreline management plans are developed by Coastal Groups with members mainly from local councils and the Environment Agency. They identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short-term (0 to 20 years); medium term (20 to 50 years); and long term (50 to 100 years). **EA's National Coastal Erosion Risk Map** also depicts this data spatially.
England	Local planning authorities are strongly encouraged to adopt the principles set out in the Coastal Concordat for England, to work in collaboration with other relevant public bodies to coordinate the consenting process for coastal development. The NPPF states that local planning authorities should identify a **Coastal Change Management Area** (CCMA) in any area likely to be affected by physical changes to the coast. A Coastal Change Management Area will only need to be defined where rates of shoreline change are expected to be significant over the next 100 years, and where the shoreline management plan policy is anything other than hold or advance the line at any time during its plan period. General policy tests for development in Coastal Change Management Areas are set out in the NPPF. Permanent new residential development (including change of use) will not be appropriate in a Coastal Change Management Area.
All	National Erosion data - e.g. See Environment Agency 'Flood and Coastal Erosion Risk Management Investment Programme 2015-2021'. National Coastal Erosion Risk Mapping (NCERM) - National (2018 - 2021)

Biodiversity (see section 1)

Developing multifunctional, strategic GI priorities, networks, and policies

Authorities should seek to embed robust spatial evidence into their spatial planning policies, so that it can be used to consistently guide strategic, sustainable decision making, and ensure development plans comply with both associated legal duties and national planning policies.

Integrating policies to support a **local green infrastructure strategy or network,** based on a holistic evidence base, into a spatial development plan can help ensure local biodiversity and adaptation priorities and opportunities are considered, protected, and enhanced holistically. Likewise, this can ensure plans comply with national-level planning polices across all four nations, to 'take a strategic approach to green infrastructure' and simultaneously take a proactive approach to climate adaptation.[8] Robust and consistent cross-thematic wording is essential for ensuring the prioritisation of successful green infrastructure policy. The GI policy tool can be used to assess the multifunctionality and strength of GI policy wording

Overseen by Natural England, the 'Thames Basin Heaths Special Protection Area mitigation and avoidance measures' are comprised of two key delivery frameworks; the Strategic Access Management and Monitoring (SAMM) project' and the provision of Suitable Alternative Natural Greenspaces (SANG).

[8] NPPF; Planning Policy Wales ; National Planning Framework 4

- **SAAMS** aims to manage the negative impact of visitors in the designated SPA region, implemented by Natural England which enforces '*monitoring, warden arrangements and public education messages'* in partnership with the relevant local authority. A detailed list of actions is created by the SAMM project manager; the programme is overseen by the SAMM project board.

In action: A 'Strategic Access Management and Monitoring Strategy' was created for the North Kent Environmental Planning Group, in response to the threat identified to Birdlife and marshland in North Kent as a result of Infrastructure development. The strategy developed by Footprint Ecology focuses on European protected sites, and internationally recognised 'birds of Interest', aiming to both 'support sustainable growth' of recreation while maintaining the Integrity of wildlife, and mitigate against existing localised damage to bird species in line with 'Article 4(4) of the Birds Directive'. An overview of possible mitigation measures includes summarised 'codes of conduct', the enhancement of existing green Infrastructure sites, enforcement recommendations, and monitoring techniques.

- **SANGS** describe greenspace which is suitable to offset the negative implications resulting from new development creation in the region of a Special protection Area (SPA). The alternative greenspaces provide an area for public recreational use and 'natural beauty', aiming to offset pressures on the SPA. SANG work is also funded by tariff contributions from all new additional residential dwellings 'within 5km of the SPA'.

In action: For the Central SANG (the first phase of SANG delivery), Surrey Heath District Council required measures to minimise wildfire risk spreading from the heathlands or from the development outwards. This needed to be considered alongside the provision of a range of habitat types which appear to be 'natural' to the user and enhance biodiversity; and to provide a network of routes. The Council introduced several changes to how it allocates Council owned or administered SANG capacity, known as Strategic SANG, including the introduction of a SANG allocation criteria. The SANG allocation criteria only applies to development proposals for net new residential development that require capacity at Strategic SANG's. the Council reduced the time period for which a planning application is valid from three years to one year. More information on SANGs is available here.

Useful tools:

- The GI policy tool is a free self-assessment tool to improve the design and wording of policies that address GI functions within planning documents.
- Mapping the potential for working with natural processes shows areas where there may be an opportunity to implement natural flood management techniques.
- Spatial prioritisation of catchments suitable for using natural flood management identifies some (generally small and rural) catchments where natural measures that slow the flow of water are likely to provide the greatest flood benefits.
- Working with natural processes to reduce flood risk is a comprehensive evidence base for working with natural processes to reduce flood risk, containing information about natural flood management techniques and their benefits.

Case Study: Carmarthenshire Revised Local Development Plan Green Infrastructure Assessment

Carmarthenshire Council have developed a Green Infrastructure assessment as part of the Local Development Plan 2018-2033. The assessment aims to create a holistic strategy to capture the 'multi-faceted' characteristic of GI and the associated indirect socio-economic benefits. Six different GI themes underpin the spatial strategy including climate change, health and wellbeing and biodiversity to provide a coordinated response.

The strategy is divided into a two-stage approach.

1. ***'To protect Carmarthenshire's existing GI assets by:***
    a. *Identifying GI assets and functions that contribute to each of the GI themes.*
    b. *Mapping the baseline of GI assets and functions across Carmarthenshire.*
    c. *Protecting assets and functions through LDP policy.*

2. ***To encourage the enhancement of GI assets by***
    a. *Identifying areas of need, based on baseline mapping.*
    b. *Identifying and providing guidance on ways in which GI can be improved and enhanced, depending on need'.*

The strategy features a map of the Carmarthenshire, generated using GIS technology to produce a detailed spatial expression of regional GI Infrastructure. This Information supports an 'evidence-based' approach to planning, allowing a coordinated data-driven approach to '*maintain, protect and enhance Carmarthenshire's GI network'* and when '*prioritizing GI projects and funding.'*

It is advised that 'GI should be a primary consideration in the site selection and design', using the cross-referenced themes identified as part of the study. Supporting Appendix 3 provides a comprehensive summary of the identified GI assets and their potential functions against six GI Themes.

Case Study: Salford local plan

Salford Local Plan - Policy GI1 Green infrastructure spatial strategy:
Development shall protect and enhance the green infrastructure network in Salford by helping to maximise its:

1. Extent, whilst having regard to the development needs of the city.
2. Interconnectedness, enabling individual pieces of green infrastructure to deliver greater benefits through links to the wider network.
3. Multi-functionality, whilst not detracting from the important primary functions of individual pieces of green infrastructure.
4. Quality, ensuring that it can meet its various functions as effectively as possible.

In complying with the above points, developments shall:

5. Respond to the specific location, characteristics and surroundings of the site to take opportunities to incorporate green infrastructure that can most effectively benefit the wider area, for example providing sustainable urban drainage systems that address identified problems such as flood risk and water quality and delivering environmental and quality of life benefits.
6. Ensure that green infrastructure is central to the design, rather than being relegated to 'left-over' land.

7. Use land and building surfaces creatively to maximise on-site green infrastructure provision, particularly within areas where there are currently major green infrastructure deficits, such as City Centre Salford and Salford Quays.
8. Seek to maximise the benefits, and where appropriate public use, of the green infrastructure, with an emphasis on promoting healthier communities.
9. Ensure that appropriate long-term management and maintenance measures are in place for any green infrastructure.

Case Study: South Gloucestershire Strategic Green Infrastructure Network [under consultation]

A new and updated Strategic Green Infrastructure (GI) Network, will be safeguarded as part of the new Local Plan. A linked strategic policy and other local policies will manage the approach to protect the integrity of the network, whilst facilitating appropriate change and development.

Designation of a Strategic Green Infrastructure Network will assist in prioritising certain areas for future investment in biodiversity, secured through the emerging national and local requirements for 'biodiversity net gain'. The aim is that investment in biodiversity and nature connected to the net gain principle, when directed to locations in the newly designated Strategic Green Infrastructure corridors, will assist with the creation of 'Wild Belts'.

The 'Green Infrastructure Corridor Study Report Introduction and Methodology' (2021) has informed consideration of the assets and areas which should form part of the Strategic GI Network.

The proposed Strategic Network of GI corridors also forms part of the emerging Local Nature Recovery Network. The intention is that the strategic network, with nine strategic corridors within the network, will be defined on the policies map. Development within or near to it will then be managed by new planning policies, strategies and plans for enhancing the GI corridors and assets within them.

V. Neighbourhood & community planning

Neighbourhood or community planning provides a further avenue by which a network of small-scale activity can support broader strategic level GI interventions and help deliver a multi-scale and multifunctional approach. Operating at this scale ensures bespoke local requirements are met, benefits are directly delivered, and communities are actively engaged in the process, whilst simultaneously delivering broader strategic aims.

Since the introduction of the Localism Act 2011, community groups in England have been able to establish Neighbourhood Forums, define Neighbourhood Area boundaries, and produce Neighbourhood Plans that, once 'made', form part of the formal planning process for an area (i.e., are incorporated within a Local Plan, where present). This provides community members with an opportunity to influence the nature of development and strategic decision making within the boundaries of the Neighbourhood Area.

The formal Neighbourhood Planning Process (NPP) only applies to England, though alternative community planning mechanisms are adopted across Wales, Scotland, and Northern Ireland. Equally, there are myriad 'informal' community planning mechanisms in operation across England, in addition to the NPP.

As noted under the 'communities' heading below diverse groups engage with GI-related activities at the community scale. These activities, both formal and informal, can support the efforts of LPAs, environmental NGOs, and other stakeholders in the planning, delivery and long-term management of nature recovery and climate resilience initiatives.

The Westminster government has put increased emphasis on the value of the neighbourhood planning process as a way for communities to express their aspirations for future development. To date, most neighbourhood plans have not included policy on climate change and nature, however, this is likely to change, as the 2022 Levelling up and Regeneration Bill has proposed local Neighbourhood development plans must contribute to the mitigation of, and adaption to, climate change.

Nation	Community planning processes
Wales	Local Development Plans - 'Delivery Agreement' includes: • A timetable for producing the LDP. • A 'Community Involvement Scheme', which explains how developers, the public, and interested groups can contribute to LDP preparation. Community Strategies • Prepared by a local strategic partnership, which includes the council and other key partners. They set out a long-term framework for the whole authority area and help decide priorities for delivering public services. • Where land-use considerations are concerned, Community Strategies are to be incorporated within the LDP.
Scotland	Community Planning Partnerships (CPPs) • One established for each of the 32 councils across Scotland. CPPs are responsible for producing: • Local Outcomes Improvement Plans, which cover the whole council area. • Locality Plans, which cover smaller areas within the CPP area, usually focusing on areas that will benefit most from improvement. Each CPP will produce at least one Locality Plan and some CPPs will produce many – there is no fixed number.
Northern Ireland	Community Planning Partnerships • One for each district, comprised of the council, statutory bodies, agencies, and the wider community, including the community and voluntary sector. Community Planning Statutory partners include: • The Education and Library Boards • The Health and Social Care Trusts • Public Health Agency • Health and Social Care Board • Police Service of Northern Ireland

- Northern Ireland Housing Executive
- Northern Ireland Fire and Rescue Service
- Invest Northern Ireland
- Northern Ireland Tourist Board
- Sports Council for Northern Ireland, (SportNI)
- Libraries NI
- Council for Catholic Maintained Schools

These partners develop and implement a shared plan for promoting the well-being of an area, improving community cohesion and the quality of life for communities.

Further guidance on neighbourhood planning is available in the Planning Guidance. A number of organisations have produced guides to neighbourhood planning. Two examples are outlined below:

National Trust (NT) Guide to Heritage in Neighbourhood Plans

The NT published document helps to guide communities in identifying local sites of ecological and historical significance, in order to retain the situated character of neighbourhoods. Focus is given to the place of heritage in planning to deliver wider socio-environmental gains, in line with the National Planning Policy framework 2019. To achieve this, it advises spatial design which supports heritage designations (conservation areas, listed buildings, monuments and historical gardens) and undesignated heritage (archaeological grounds, outstanding national beauty and nature reserves), encouraging community and stakeholder participation throughout. It includes step by step details of the full consultation process, using an evidence-based approach.

Locality: How to create a Neighbourhood Plan

Locality have developed a 'neighbourhood plan roadmap' as a comprehensive educational toolkit to help untangle the multiple policies and statutory legislation tied to the planning process. The mission of the 2018 roadmap is to provide an accessible guide to place-making, ensuring all community members have the ability to contribute. Guidance to the content and structure of neighbourhood plans emphasises the importance of sustainability when setting long term aims from local green space designation to the Implementation of land-use policies which protect local biodiversity.

The Environment Agency has contributed to the development of a neighbourhood planning toolkit hosted on the Locality website which provides advice on how to consider 'the environment in Neighbourhood plans. The Landscape Institute has also produced information on design and green infrastructure for neighbourhood plans.

Neighbourhood plans do not need to just repeat policy in a Local Plan, but can usefully provide more detail or target specific features for enhancement, for example hedgerows.

Case Study: Wilmslow Neighbourhood Plan (WNP)

The WNP takes a policy-led approach to ensure all development reflects the key aspirations of residents, as discerned from local surveys during the consultation process. Throughout the plan attention is given to the preservation of natural recreational spaces and River Valleys, whilst tackling issues of poor public transport infrastructure and the inadequate diversity of housing provision.

Five areas of policy structure the Plan; Local strategic Policies, Natural and Built Environment, Infrastructure, Managing Growth and Town Core Policies. These create a structured foundation towards achieving the councils eight underlying objectives. All planning proposals must ensure development aligns the vision to 'enhance a dynamic community' and protects 'its special built and natural character' generating a green and sustainable environment.

Case Study: Yoxall's Neighbourhood Plan (East Staffordshire)

The Neighbourhood Planning Group undertook a 'character analysis' of their plan area, looking at development constraints also enhancement opportunities too. This approach was underpinned by considerable community involvement, which included feedback that local residents wanted to see green space improvement through the introduction of new uses and making them more accessible. The resulting plan includes dedicated policies on Green Infrastructure and design, requiring enhancement as well as protection and a need for new development to introduce new uses to existing public open spaces.

Case Study: Saham Toney Neighbourhood Development Plan 2019 - 2036

To address local concern and historic flooding issues, the Sahmah Toney neighbourhood development plan contains significant requirements to address flooding issues.

- Proposals for major development will need a site-specific Surface Water Drainage Strategy, to demonstrate development will not increase flood risk on site or elsewhere by the installation of a site-specific sustainable drainage scheme.
- Surface water run off mitigation measures shall address any identified risk of flooding, based on the LLFA's order of priority; Access, Avoid, Manage and Mitigate.
- Proposals for appropriate on-site storage and run off rates will be expected to meet the standards set in technical guidance issued by Norfolk County Council as LLFA and as set out in DEFRAs Non-Statutory Standards for Sustainable Drainage, the CIRIA SuDS Manual and other relevant codes of practice.
- In accordance with Lead local Flood Authority requirements, Flood Risk Assessments and Surface Water Drainage Strategies, where required, shall be submitted at the application stages.

Design requirements and guidance with respect to the design of sustainable drainage systems are given in the Saham Toney SuDS Design Manual.

The Nature and Resilience Playbook

Part 3 – Development management, standards, and planning policy

Section Contents

Summary of recommendations

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    Environmental net gain

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Summary of recommendations

Recommendation 1: Planning policies should require green infrastructure to be delivered through new development in line with best-practice principles in local and national GI frameworks.

As a minimum, these should reflect national guidance and frameworks being produced. Local frameworks and bespoke principles can also be developed to provide a more targeted approach for the local area. The use of appropriate established assessment frameworks and systems is recommended to help ensure high-quality outcomes.

Recommendation 2: Authorities should develop and introduce greening factors into local planning policies or design codes.

GI Scoring should be customised to support local strategic priorities.

Recommendation 3: Local planning authorities should set tree canopy cover targets in local planning policies

This should include detailed requirements involving Arboricultural Impact Assessments to be conducted and tree protection and planting plans be submitted. Ambitious tree canopy cover policies should require applicants to assess existing canopy cover using the BS5837 tree survey.

Best practice indicates that targets should aim for approximately 20 to 25% coverage in order to achieve the associated benefits. Targets may be higher in rural areas, and in central urban areas physical constraints may mean targets are towards the lower end of this recommended range.

Recommendation 4: Local planning authorities should develop planning policies that look favourably on plans involving specific GI Interventions assessed to be most relevant to the nature and strategic priorities of their areas (in line with local strategies)

Such as green roofs, in urban areas. Authorities should use, and signpost to, relevant tools to aid delivery. See examples.

Recommendation 5: Authorities should introduce standard planning conditions and policies to require low cost/no regret biodiversity enhancement measures

This should include no regret / low-cost measures such as swift boxes, bee bricks, hedgehog highways and water butts. Accompanying Guidance notes should be provided to help ensure effective delivery.

Recommendation 6: Design codes, guides and masterplans should include ambitious resilience measures and nature-based design solutions

Design codes, guides and placemaking initiatives should seek to reflect best-practice examples, guidance and initiatives. Nature-based solutions and landscaping level solutions should be prioritised within master planning, to enhance the climate resilience and biodiversity of development. For ambitious authorities, requirements should be set that a site-specific design code is prepared for every major housing application, building on and delivering the provisions in an authority-wide code.

*A **design review panel** should be established or externally commissioned as a chargeable service, with a policy requirement and all major housing projects should be subject to a programme of design review.*

Nature based solutions and landscaping level solutions should be prioritised within master planning, to enhance the climate resilience and biodiversity of development. Such as replacing hard surfaces with soft landscaping and trees, which can reduce embodied carbon whilst also delivering increased biodiversity net gain and a reduction in flood risk.

Recommendation 7: Authorities should introduce polices and requirements to directly combat overheating in new development

Including:

- *Demonstrating compliance with the cooling hierarchy (See London Plan) and best-practice guidance.*
- *Require the use of the TM52 and/or TM59 dynamic thermal modelling approach in relation to key building typologies and heating systems, where there is a higher risk to occupants of overheating, using the latest weather datasets for current and future temperatures (e.g., Design Summer Years).*
- *Deliver multifunctional green infrastructure in line with best-practice recommendations, such as tree canopy cover targets [see above] and blue Infrastructure/wetland creation.*
- *Include policies to discourage hard surfacing and encourage soft landscaping*
- *Introduce policies to look favourably on the installation of no-regret adaptation measures, such as the installation of external shutters, awnings, and blinds.*
- *Apply the high-risk simplified approach for suitable risk areas outside of London.*
- *Require a **Sustainability Statement** be submitted to demonstrate compliance with the above, including signposting to the use of a locally developed, or nationally recognised screening tool. The London Plan now requires the use of the GHA overheating toolkit. Other tools include BRE's temperature reporting tool, currently used as part of the Home Quality Mark or the Passivhaus Planning Package (PHPP) to screen for a high overheating risk and there may be potential need for further measures.*

Stretching requirements include:

- *All large developments implement a soft landings approach from 'Phase 1: Inception and Briefing' as per BSRIA BG 54/2018 Soft Landings Framework 2018, to ensure any building requirements set at the beginning are maintained throughout the project from inception to completion and beyond.*
- *All developments shall put in place a recognised monitoring regime to allow the assessment of energy use, indoor air quality and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy and ensure that the information is provided to the applicable owners and the planning authority.*

Recommendation 8: Polices should include clear requirements for property flood resilience measures to be included in relevant development, particularly in at-risk areas

These measures should be specified and installed in accordance with the industry Code of Practice for property flood resilience. In addition:

- *Local policies should require the use of sustainable drainage systems (SuDS) on all development over one dwelling (minimum), including requirement for SuDS systems to incorporate multi-functional benefits (as set out within the SuDS Manual).*

- *Policies should require surface water management features should be designed in accordance with the nationally described Hierarchy of Drainage and the most recent edition of the CIRIA SuDS Manual and DEFRA's technical standards on sustainable drainage systems.*
- *Policies should be introduced to discourage development with significant levels of hard surfacing and instead, look favourably on plans involving significant soft landscaping, green and blue infrastructure and solutions such as permeable paving.*

Recommendation 9: Authorities should seek to introduce ambitious water efficiency requirements

- *Local authorities (in England) should adopt the 110 lpppd standard.*
- *Authorities should introduce policies to encourage or look favourably on rainwater/ greywater harvesting technology.*

Recommendation 10: Authorities should seek to introduce ambitious and tailored biodiversity net gain (BNG) requirements

Authorities should:

- *Introduce a target for development to deliver 20% net gain on large sites, prioritising off-site enhancement linked to local nature recovery priorities, particularly in securing additionality beyond the minimum.*
- *Ensure that BNG contributes to wider nature recovery plans and strategic objectives, linking to local strategies (see section 2).*
- *Develop a Supplementary Planning Document to set out details of the preferred BNG delivery approach, including a strategy for achieving the desired balance of on-site off-site delivery. This should include support and specific guidance for delivering appropriate habitats, such as appropriate wildflower species planting.*
- *Require the delivery of measurable outcomes and associated best practice, including the latest Defra metric(s), or the new British Standard for BNG – BS 8683. This standard identifies the ecological data required and considerations for its assessment, and its use in the design of mitigation measures.*
- *Integrate and fully reflect consideration of the mitigation hierarchy.*

i. Introduction

Under the current plan-led system, to ensure new development delivers measures to enhance resilience and biodiversity, local development plans must contain detailed policies and requirements on climate adaptation and biodiversity enhancement. Only by ensuring robust resilience and biodiversity enhancement measures are central to local planning policies will a local planning authority have effectively discharged its legal obligations outlined.

In the following sections, we have made recommendations about the requirements we believe authorities should introduce to drive sustainable development in their area, based on feedback of what is both suitably ambitious and achievable. We recognise that a patchwork of different standards in different locations is challenging for developers. The approach we have followed attempts to balance the need for consistency with the need to enable local government to set suitably ambitious policy.

This is also aligned with the position UKGBC has taken with central Government. We advocate for strong national policy, which sets out very clearly a future trajectory of escalating minimum standards – which local authorities can move in advance of, whilst maintaining consistency in terms of metrics and approach.

In developing local policies, general principles planning authorities should follow include:

- Ensuring that adaptation and biodiversity are embedded throughout the development plan policy narrative.
- Developing sustainability policies in an integrated and holistic way to deliver multifunctional benefits across related areas.
- Ensuring that the requirements placed upon development are clear and precise wherever possible, in order to create certainty for the community and applicants.

Where a local planning authority is keen to strengthen its planning requirements in relation to biodiversity recovery and climate change adaptation, but a full review of the local development plan is not scheduled or feasible, the following options should be considered.

- Producing a local design code
- Conducting a partial review of the local development plan
- Producing supplementary planning guidance
- Producing guidance to maximise the benefits from biodiversity net gain

This section examines key policy areas and recommendations action thematically, with examples of ambitious, workable policies that can be implemented.

ii. Green Infrastructure standards and policies

Multifunctional green infrastructure standards can play an important role through planning as a mechanism to deliver multiple social, environmental, and economic benefits, particularly in relation to the delivery of strategic green infrastructure networks outlined in Section 2, as well as localised interventions.

UKGBC has conducted extensive research on green infrastructure best-practice principles, case studies and funding:

- Demystifying Green Infrastructure (GI)
  This aim to simplify the complexities of GI by consolidating existing information. Written with clients and developers in mind, the report creates a 'business case' for GI, translating the financial and market advantages from the intrinsic benefits of GI
- Making the Case for Green Infrastructure: Lessons from Best Practice
  This uses five case studies to demonstrate how to integrate Green Infrastructure into the planning process with consideration of the multiple, diverse stakeholder interests.

National planning policies and associated guidance across all four UK nations (listed below) are key drivers in terms of encouraging green infrastructure, outlining relevant principles and providing hooks for greater local ambition.

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, taking into account existing natural assets and the most suitable locations and types of new provision.

Nation	Policies, frameworks, and guidance
England	National Planning Policy Framework (NPPF)
	Updated Planning Practice Guidance - Natural environment
	Natural England GI Standards Framework
	National Model Design Code
	National Design guide Natural England's Green Infrastructure Guidance (NE176) Green Infrastructure Framework - Principles and Standards for England
Scotland	Scotland 2045: Our Fourth National Planning Framework Green infrastructure: design and placemaking Designing Streets Creating Places: A policy statement on architecture and place for Scotland The Place Standard tool
Wales	Planning Policy Wales Future Wales: The National Plan 2040 Technical Advice notes Planning policy and guidance: green infrastructure
NI	The Strategic Planning Policy Statement (SPPS)

Regional Development Strategy 2035
Living Places – An Urban Stewardship and Design Guide for Northern Ireland
Building on Tradition – A Sustainable Design Guide for the Northern Ireland Countryside
Creating Places: Achieving Quality in Residential Environments
Trees and Development - A Guide to Best Practice

In setting relevant local **green infrastructure policies and standards** through planning, authorities should take the following approaches:

- Create **spatial policies** to protect and enhance green infrastructure networks, maximizing strategic level resilience and nature recovery (see section 2)
- Create specific **policies** to deliver high-quality, multifunctional green infrastructure through new development: either through applying frameworks, principles or requiring specific interventions (including further details in supplementary policy documents and/or design codes)
- Setting **area-based targets** such as tree canopy cover or urban greening requirements, to deliver specific green infrastructure interventions were necessary, for example, in addressing specific issues or inequalities. Natural England's 'Accessible Green Space Standards' (ANGST) can be used as a complimentary guideline - see case study below.

a) GI Standards, principles, and frameworks

Local policies should specify and define the key green infrastructure principles, benefits, and requirements to be delivered through new development. These should include:

- The **protection of existing green infrastructure assets** and the use of the **mitigation hierarchy**
- **Strategic interconnection -** with GI/BI enhancements aiming to support wider spatial priorities, opportunities and networks - including local conservation priorities (including those identified in local nature recovery strategies) and nature recovery networks.
- **Multifunctionality -** including maximising the relative social, biodiversity, climate adaptation and economic benefits. (in particular, see Best Practice Principles for Delivering Urban NBS)
- **Making provision for the management and long-term maintenance of green infrastructure**
- **Adequate buffers between key habitats and development,** i.e., ensuring a recommended 15-metre buffer between the development and woodland.

These connect to, and are explored in more detail through, UKGBC's **Best-practice Principles for Delivering Urban Nature-Based Solutions.** These include guidance on 1 - defining clear ambitions & goals upfront; 2 – assessing risks, function and quality, 3 - maximising multifunctionality; 4 - articulating value, costs, benefits and identifying sources of funding; 5 – developing long-term management plans; 6 - collaborating with key stakeholders on education and innovation.

More specific GI standards and associated frameworks can act as a vital benchmark for the industry to ensure a consistent delivery quality and help quantify the intended multifunctional benefits. Authorities can either embed specific principles into their local planning policies and signpost to relevant frameworks and tools to demonstrate compliance, or require specific approaches are followed.

Case Study: Natural England (NE) Green Infrastructure Standards

Complimentary to the 25-year Environment Plan, Natural England's Green Infrastructure plan, currently under development, aims to develop specific standards and principles to support the delivery and/or improvement of UK GI.

These can act as a blueprint to help local authorities and developers to best deliver and maintain Green Infrastructure to a quality which satisfies the ambitions of wider UK statuary climate targets, while addressing issues of social inequality and health/wellbeing.

Natural England have developed two key divisions of work:

1. A 'best-practice' framework
2. A beta GI digital open access mapping tool

The framework is structured by a series of three baseline principles: the necessary benefits of GI, its defining elements, and the exact process of implementation. These three documents can be explored on the NE web portal, detailing the ambition and theory behind each principle with reference to supporting case studies and relevant, interlinking government policy.

An aggregation of 40 different data sets, the NE mapping database tool uses demographic and cartographic information to map the varying access* to UK Green and Blue infrastructure assets (including private gardens, woodlands and 'natural space') against multiples green space standard metrics. The map can be used to identify sites to prioritise GI intervention. As a beta version, future analysis will be extended to include the quality of green space, potential connectivity between sites and an index of social deprivation.

'Accessible Green Space Standards'
Natural England's 'Accessible Green Space Standards' (ANGST) can be used as guidance to assess appropriate green space allocation, and stipulates:

1. *'No person is to be located more than 300 metres from the nearest natural green space of at least 2 hectares (ha) in size; and'*
2. *'The provision of at least 1 ha of Local Nature reserve per 1,000 population'*

Case Study: Essex Green Infrastructure Standards

The Essex Green infrastructure standards build upon the Natural England framework to create a regionally specific set of principles, supporting decision making process and delivery of GI tailored to Essex's geography. It will also soon be added to the Essex Design Guide under Supplementary Guidance.

In collaboration with 10 partners, the plan outlines 9 different principles foundational to local GI delivery and cover the following:

1. How to mainstream and integrate GI into local placemaking
2. The importance of an 'evidence-led' approach
3. Enhancing multifunctionality to deliver multiple, cross-cutting benefits
4. How to generate early engagement will all stakeholders
5. Managing alternative stakeholder interests and expectations in the short and long-term
6. Creating GI to enhance health, wellbeing and social equity
7. Planning GI to ensure connectivity between spaces to create a 'green network'

An explanation is given to how best achieve each principle, accompanied by illustrated case study examples, all to be used in combination with the Essex design guide. The publication also allows Local Authorities to confidently self-assess Green Infrastructure projects - to ensure alignment with principles of NE standards, as well as monitor long-term progress to quantify extrinsic positive externalities.

Case Study: Building with Nature (BwN)

BwN Standards provide a framework of evidence-based, industry-tested standards that define high-quality green infrastructure. The standards can be adopted by local authorities as a benchmark for assessing and accrediting the quality of development. The 12 standards are built around the themes of Core, Wellbeing, Water, and Wildlife, helping residential and commercial developers to design and deliver high-quality green infrastructure, and guiding policy makers in clearly defining requirements for green infrastructure in policy documents.

Developers can be signposted to use the BwN Standards and 'how-to' guidance, to create better places for people and wildlife. In addition, local authorities may also encourage, or require, successful achievement of a BwN Award as a preferred mechanism for demonstrating a commitment to design and build quality. A BwN Award is an external verification that reassures a range of stakeholders that the benefits of high-quality green infrastructure will be more effectively secured at each stage of development, including implementation and post-construction, and by requiring evidence of effective arrangements for long-term management and maintenance. There are two types of BwN Award for physical development:

- The BwN Design Award is used to accredit projects at an early stage of design, for example an outline planning application in larger schemes.
- The BwN Full Award is used to accredit projects at a more detailed stage of design and includes a post-construction check.

The BwN Standards can also support policy making. Strategic policy documentation, such as Local Plans and SPDs, can be strengthened by integrating the BwN Standards wording or content. Policy documents can also achieve a BwN Policy Award. Exact step-by-step guidance of applying such principles is provided separately for developers, planners, and professionals, complimented by case study examples.

West Dunbartonshire's Local Development Plan 2 has been accredited with a 'Building with Nature' Policy Award which means that the policies within the Plan ensure that Green Infrastructure is considered from the outset of the development process, throughout its construction, and is sustainably managed after the development has been completed.

Case Study: The GI planning policy assessment tool

The GI policy tool assesses the multifunctionality and strength of GI policy wording, using the English National Planning Policy Framework (NPPF) and Planning Policy Wales 10 (PPW10) as case studies. The tool has multi-scalar application at regional and municipality/local authority and neighbourhood levels for both statutory and non-statutory plans. The quality of GI relevant policies in Local Development Plans, and supporting Supplementary Guidance, in 19 local authorities within the Central

Scotland Green Network (CSGN) area were assessed against the 23 GI policy assessment criteria based on a GI Benchmark.[9]

The Wildlife Trusts' Biodiversity Benchmark can be used by landowners to manage the continual improvement of biodiversity enhancement and protection. The Benchmark is designed to complement ISO14001, which maps out a framework that a company or organization can follow to set up an effective environmental management system.

Further tools and guidance to help deliver best-practice Green Infrastructure are available through the Green Infrastructure Partnership resource library accessible here.

Recommendation: Planning policies should require green infrastructure is delivered through new development in line with key guiding best-practice principles local and national GI frameworks.

b) Urban Greening Factors

Urban Greening Factors (UGF) can be used by local authorities as an evaluative tool to assess the quality and quantity of 'greenscapes' incorporated into infrastructure developments. UGF aims to support an increase in general green cover by acting as a minimum baseline. In England, the National Model Design Code highlights greening factors as a key tool for delivering high-quality, local biophilic design.

The new London Plan 2021 Policy G5, Urban Greening, requires all new developments to demonstrate an 'appropriate' degree of greening within local plans where the layout, design, and ongoing maintenance plan of proposed green sites must be outlined. Determining whether developments comply with the UGF, can be calculated using a quantitative metric by comparing the surface area the green space assets against the allocated asset score (on a scale of 0-1 as demonstrated by Table 8.2), divided by the total development area.

$$\frac{(Factor\ A\ x\ Area)\ +\ (Factor\ B\ x\ Area)\ +\ (Factor\ C\ x\ Area)}{Total\ Site\ Area}$$

Including pre-existing green cover on site, a target score of 0.3 is proposed for commercial buildings and 0.4 for residential as a minimum.

[9] M Hislop and A Corbett: Green Infrastructure Policies in the CSGN: A Review of Local Authority Policies on Green Infrastructure in Built Development. GCV Green Network Partnership, 2018; https://www.gcvgreennetwork.gov.uk/publications/790-gi-policies-in-the-csgn

Table 8.2 - Urban Greening Factors

Surface Cover Type	Factor
Semi-natural vegetation (e.g. trees, woodland, species-rich grassland) maintained or established on site.	1
Wetland or open water (semi-natural; not chlorinated) maintained or established on site.	1
Intensive green roof or vegetation over structure. Substrate minimum settled depth of 150mm – see livingroofs.org for descriptions.[A]	0.8
Standard trees planted in connected tree pits with a minimum soil volume equivalent to at least two thirds of the projected canopy area of the mature tree – see Trees in Hard Landscapes for overview.[B]	0.8
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket) – meets the requirements of GRO Code 2014.[C]	0.7
Flower-rich perennial planting – see RHS perennial plants for guidance.[D]	0.7
Rain gardens and other vegetated sustainable drainage elements – See CIRIA for case-studies.[E]	0.7
Hedges (line of mature shrubs one or two shrubs wide) – see RHS for guidance.[F]	0.6
Standard trees planted in pits with soil volumes less than two thirds of the projected canopy area of the mature tree.	0.6
Green wall –modular system or climbers rooted in soil – see NBS Guide to Façade Greening for overview.[G]	0.6
Groundcover planting – see RHS Groundcover Plants for overview.[H]	0.5
Amenity grassland (species-poor, regularly mown lawn).	0.4
Extensive green roof of sedum mat or other lightweight systems that do not meet GRO Code 2014.[I]	0.3
Water features (chlorinated) or unplanted detention basins.	0.2
Permeable paving – see CIRIA for overview.[J]	0.1
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone).	0

Recommendation: Authorities should develop and introduce greening factors into local planning policies or design codes.

- ***GI Scoring should be customized to support local strategic priorities***

c) Tree canopy cover targets

Trees have attracted specific attention in local and national planning policies, strategies, and targets. In England, the NPPF was recently amended to introduce a presumption that planning policies and decisions should ensure that new streets are tree-lined that opportunities are taken to incorporate trees elsewhere in developments (such as parks and community orchards), unless there are clear, justifiable, and compelling reasons why this would be inappropriate.

The UK Government has set an overall target of planting 30,000 hectares per year by the end of this Parliament (2024), with an England Tree Action Plan 2022-2024, and similar targets in place in

Scotland, Wales (Policy 63) and Northern Ireland. At the local level, several authorities have set tree planting or tree canopy cover delivery targets, alongside dedicated initiatives.

The multi-functional benefits of tree planting, particularly in urban areas, are well known. From providing biodiversity enhancement to flood resilience, carbon sequestration, combating the urban heat island effect and noise cancellation. Trees planting therefore represent an important intervention for development provide vital benefits for residents and addressing GI inequalities. Useful tools and current approaches for tree canopy measurement include the following:

Tool	Description
i-Tree Eco	i-Tree Eco is a software application which is used to quantify the structure and environmental effects of urban trees and calculate their value to society. Data from an i-Tree Eco survey can be used for making effective resource management decisions, developing policy and setting priorities for a town's trees and greenspaces.
BS5837 tree survey	A pre-development tree survey to address tree retention (or otherwise) in proposed development design, demolition and construction. It involves recording and mapping all trees and their attributes to inform a development plan, including tree retention and constraints data. The Tree Constraints Plan must include: accurate position and crown spread; a Tree Quality Assessment.; the Root Protection Area.; Future Growth Potential (crown spread and height); Shade footprint throughout the day based on future growth potential.
Bluesky's National Tree Map™ (NTM™)	**Bluesky's National Tree Map™** covers the whole of UK and includes interpretation of individual trees height and spread that can be analysed on a spatial level. Use is bound by terms of Bluesky licence. Does not include finer grain data such as species.
Urban Tree Cover (Beta)	A beta mapping tool under development designed to capture Urban Tree Cover.

Tree planting, or tree canopy cover levels, can be encouraged or specifically required through planning policy. A good level of ecosystem services is likely to be delivered at 25% canopy cover. Testing shows that it should be possible for developments of around 35% (dependent upon development form). The CABE publication '*What makes an eco-town*?' suggested canopy cover of at least 25% in residential areas.

Case study: Wycombe district local plan

Wycombe district local plan - Policy DM33 – Delivering Green Infrastructure in Development

Development is required to:

1. Ensure the continued enjoyment of footpaths and other existing green infrastructure providing opportunities for active transport or outdoor sport.
2. Avoid the loss, fragmentation or reduction in size of any woodland.
3. Secure a minimum 15 metre buffer to Ancient Woodland.

4. Avoid the loss, fragmentation or reduction in size of any incidental open space, where this contributes to the character and function of the area.
5. Ensure that priority is given to the retention and protection of trees, hedgerows, or other landscape features which are, or could become, valuable features of the site for their visual amenity, historic, biodiversity or other value.
6. Maximise the opportunities available for green infrastructure and biodiversity enhancement through the improvement of existing features and the creation of new features so as to ensure no net loss of biodiversity and where deliverable net gains.
7. Achieve a future tree canopy cover of at least 25% of the site area on sites outside of the town centres and exceeding 0.5ha.
8. Make provision for the management and maintenance of green infrastructure.
9. Enhance the natural and built environment to achieve a net gain in biodiversity through:
    a) Achieving high standards of built and landscape design.
    b) Taking opportunities to enhance environmental assets on and off site.
    c) Taking opportunities to reinforce or augment biodiversity and landscape networks on and off site.
    d) Mitigating any essential or residual impacts by requiring development to enhance environmental assets either on or off-site.

Where trees on or adjacent to a site could be affected by development proposals, the District Council will expect planning applications to follow the process set out in British Standard 5837:2012 Trees – in relation to design, demolition and construction (or subsequent revisions), with the use of buffers which exclude damaging activity or other suitable protective measures. The Council will require a tree survey and an Arboricultural Impact Assessment (AIA) to be submitted. Where special techniques and tree protection methods will be necessary for successful implementation, details of them must also be included in the form of a Tree Protection Plan (TPP) and Arboricultural Method Statement (AMS).

The Council proposes to publish guidance (Designing Trees into New Development) which includes standards on soil volumes to enable newly 170 planted trees to grow healthily to a size where they can fulfil the canopy cover standards. It also includes design guidance on how tree crowns can be accommodated.

Development proposals should be designed so as to retain existing trees where appropriate, and to plant new trees to help ensure opportunities to enhance biodiversity are maximised. Above the stated thresholds this includes a requirement for new development to achieve a 25%future tree canopy cover target. Further guidance is included in the **SPD**.

An Arboricultural Impact Assessment should be prepared, identifying significant vegetation on and adjacent to the site; the quality and value of that vegetation, at the time of the assessment; the effect that stages of the development could have on individuals; the significance of such impact in landscape terms and any appropriate methods to be adopted in order to mitigate any potentially negative impacts.

Depending on the density and complexity of new development, it may also be necessary to prepare and submit a methodology for the protection of trees agreed to be retained for approval. This would take the form of an Arboricultural Method Statement, which details the exact measures that any contractors should follow whilst completing construction work on site.

Effective tree planting in development master planning should have input from the whole design team, and include certain key information. A **Tree Protection Plan** must be produced for retained trees for it

to be acceptable. The submission of this information must be included with the application and cannot be left to condition.

A robust site **tree planting or master plan** should include:

1. **The number and species of trees to be planted and their location**, accompanied with the expected **canopy cover & the soil volume**

   Required for 1m^2 of canopy cover (the upper layer of tree cover), is a minimum of 0.6 m^3 in soil volume. The correct soil volume must correspond with the variety or species of tree (as growth/height varies considerably), to allow ample room for growth preventing any constraint to future canopy cover. Councils must therefore set their own standard expectations regarding required height, growth and spread. More information on required soil volume is available here.

2. **Details of how the soil volume will be provided.**

   This can be achieved through several techniques, for example detailing design elements such as grilles, cages and lighting; maintenance information (watering, checking mechanisms); and planting specifications (tree profile).

   Information should be provided in accordance with specific soil type; in the case of hard landscapes, councils can use the specification guide 'Trees in Hard Landscapes - A Guide for Delivery'. For soft landscapes, specific soil characteristics must be provided to demonstrate that the conditions are appropriate in the volume used for rooting.

In developing a tree canopy cover policy, further important points to consider include:

- Factoring in maintenance and management within tree policy.
- **Developing different policy requirements for different types of development**, use-classes, sizes, and locations. Exempting developments below a certain size (less than 0.5ha or less than 10) may incentivize the splitting of their applications to avoid the policy. Likewise, development in central urban areas, likely to be most in need of tree canopy enhancement, may involve large numbers of small sites, with a potentially high cumulative impact.
- ***To maximise the benefits of and volume trees to be delivered, it is recommended that following lower variable requirements are preferable to total exemptions for smaller or difficult sites. Priority should be given to ensuring the development of small urban sites in areas of low canopy cover deliver tree planting requirements.***
- The different **benefits delivered by tree planting will vary according to the species used**. For detailed guidance on species, see:
  - **Tree Species Selection for Green Infrastructure**: A Guide for Specifiers, Trees and Design Action Group,
  - **Species Selection: A Guide to Informed Decision Making,** Barcham Trees

Further useful guidance on design and general best practice to maximise the different benefits of trees is available through the **Tree Design Action Group**.

Recommendation: Local planning authorities should set tree canopy cover targets in local planning policies, aiming for round 25%.

Tree canopy cover policies should require applicant to assess existing canopy cover area (m2) using BS5837 tree survey.

d) Specific NBS interventions

Policies can specifically encourage certain GI assets including green, street vegetation (trees and wildflowers) and sustainable drainage systems. Several local authorities have already introduced planning policies and requirements to require, or look favourably, on specific GI interventions.

Such requirements are increasingly common internationally. Copenhagen for example, has mandated that all roofs with a pitch above 30° must green[10], and San Francisco requires all new residential buildings under 10 occupied floors, and all new non-residential developments with an area above 2000m2 to dedicate 30% of their roof space to vegetation.[11]

Whilst individual interventions should be encouraged, a site-specific assessment is recommended to uncover the specific forms of green cover which are most appropriate based on the contextual challenges. The case studies below outline useful tools for considering what individual measures should be prioritised in order to deliver the desired local benefits, including biodiversity enhancement and climate adaptation.

Case Study: GI Screening Tool; Conservation Evidence

The Conservation Tool, investigates the efficacy of a variety of different greening Intervention strategies, to support organisational decisions when approaching biodiversity restoration and maintenance. The tool comprises of a meta-analysis of both scientific and academic literature exploring evidential socio-ecological consequences of specific 'ecological actions' from land/water management to law/policy.

With a library of over 8000 studies, organisations can perform a case specific analysis using a multitude of indicator filters. Categories include 'action type', form of habitat, the fauna and flora focus (i.e., bats, birds, forest), geography, climatic threat and any additional key identifier phraseology. Using the tool enables a more authentic application of green intervention strategies, querying both the authenticity of the intervention itself, and its site-specific applicability.

Case Study: IGNITION Evidence Review

The IGNITION project featured an empirical study of the multidimensional benefits of Nature-Based Solutions (NBS), aimed at supporting investment of green infrastructure in the context of Greater Manchester. Cocreated by 12 partners including government, universities and business, the programme explores the use of NBS as a tool to elevate urban resilience in the face of increasing

[10] Gary Grant and Dusty Gedge (2019). Living Roofs and Walls from Policy to Practice: 10 years of urban greening in London and beyond. P22
[11] Green Roofs for Healthy Cities (2019). Green Roof and Wall policy in North America: Regulations, Incentives and Best Practices. P17

climate related risks. A supporting 'evidence base document summarises the key benefits of six different NBS strategies identified and compiled across more than 1000 sources.

The document illustrates 'headline' findings for sustainable drainage systems, street trees, SuDS-enabled Street trees, green roofs, green walls and urban green spaces and their associated costs. Street trees for example, demonstrate a *'60-80% similarity on species richness to a natural pond'* with the average *'CAPEX installation cost'* for a raingarden totalling only £336 per m2.

Benefits are categorised across impact areas: *Climate Change Mitigation and Adaptation; Resource Use; Nature and Biodiversity; Health and Wellbeing; and Socio-economic Impact*. Within each area, the report details how NBS can holistically benefit businesses and building performance. For example, how natural infrastructure can support the transition towards a circular economy, by reducing resource use through the extension of infrastructure longevity (lowering surface temperature by up 11°C) and reducing water waste (green walls exhibiting a 75% retention rate of rainwater run off).

The full findings from IGNITION can be utilised as an evidence based for the Implementation of NBS solutions across a variety of localities, helping business, government and NGO's amplify the resilience of urban communities.

Case Study: NATURE Tool

The Nature Tool for Urban and Rural Environments, aims to support built environmental professionals to meet wider UK sustainability targets through an objective self-assessment of ecological net gain on a project scale. The digital resource was co-created by WSP and the Ecosystems Knowledge Network, Northumbria University, with over 30 industry professionals.

A site-specific percentage score is calculated using the existing natural capital in sum with the potential positive ecological and social net gain consequence of infrastructural development. Quantified using 17 different ecosystem service categories, scores are compared to local and national policy to assess whether developments align with baseline requirements. The tool assists developers, local planning authorities, land managers and strategic planners to define the exact actions required to meet local environmental targets and therefore prioritise optimal green infrastructure measures.

Other useful tools include:

- **Applied Ecology Resources (AER)** - A globally accessible open platform to share information on the management of biodiversity to support evidence-based decision making.
- **Connecting nature framework and toolkit -** A process tool framework to help organisations towards the large-scale implementation of NBS.
- **Nature4Cities** - A reference Platform for Nature Based Solutions, offering technical solutions, methods and tools to empower urban planning decision making.
- **The Green Infrastructure Valuation toolkit** - A set of calculator tools to assess the value of a green asset or a proposed green investment. Where possible, the benefits of green infrastructure are given an economic value. Other quantitative contributions (e.g., number of jobs) and qualitative contributions (e.g., case studies or research) can also be provided.

Recommendation: ***Local planning authorities should develop planning policies that look favorably on plans involving specific GI Interventions assessed to be most relevant to the nature and strategic priorities of their areas. These should be in line with local strategies, such as green roofs in urban areas, using and signposting to relevant tools to aid delivery.***

For authorities seeking to be more ambitious, obligations should explicitly reference minimum technical standards for different types of intervention for green roofs, such as the 2021 GRO Green Roof Code.

Case study: Leeds Local Plan

Leeds Local Plan - Policy G1: enhancing and extending green infrastructure

Where a development is considered to be acceptable within or adjoining areas defined as Green Infrastructure on Map 16 or on any future LDF Allocation Documents, development proposals should ensure that:

(i) Green Infrastructure/corridor function of the land is retained and improved, particularly in areas of growth.

(ii) Where appropriate, the opportunity is taken to extend Green Infrastructure by linking green spaces or by filling in gaps in Green Infrastructure corridors, including (where relevant) extending these into Leeds City Centre. Street trees and green roofs are particularly encouraged.

Case study: Camden

Camden Local plan - Policy CC2 Adapting to climate change

The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as:

a. The protection of existing green spaces and promoting new appropriate green infrastructure.
b. Not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems.
c. Incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate.
d. Measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

The Council will promote and measure sustainable design and construction by:

e. Ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation.
f. Encourage new build residential development to use the Home Quality Mark and Passivhaus design standards.
g. Encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve “excellent” in BREEAM domestic refurbishment.
h. Expecting non-domestic developments of 500 sqm of floorspace or above to achieve “excellent” in BREEAM assessments and encouraging zero carbon in new development from 2019.

In addition, there are several **low/no regret options** that can easily be delivered today in new development and should be required through planning policy. These include:

- Bee and swift bricks
- Water butts
- Hedgehog highways
- Bird and bat boxes
- Bug and insect hotels

Several local planning authorities have already set standard planning conditions so that, where appropriate, these low-cost nature conservation features can be secured as minimal net gains and/or 'best practice' through the council's development management process. These include:

Case Study: Cornwall

Climate Emergency Development Plan
Policy G1 – Green Infrastructure Design and Maintenance
"9) The development shall include a minimum of one Bird Box, One Bat Box and One Bee Brick per dwelling or unit."

Case Study: Brighton and Hove City Council

New build developments of 5m or greater in height are required to incorporate swift bricks/boxes, with regard to the council's Guidance note for provision of swift bricks. As recommended in the guidance, internal swift bricks that are integrated into the walls are preferred to external boxes, where feasible.

Swift bricks/boxes should be secured at the following rate:

- Minor residential development should provide a minimum of 3 swift bricks, or two per residential unit, whichever is the greater.
- Minor commercial development should provide 3 swift boxes, or one per 50sqm of floorspace, whichever is the greater.
- Major developments should seek to secure similar provision and will be recommended by the council's ecology advisor.
- Householder extensions should also have regard to the Swift Guidance and provide a swift brick/box on any suitable development greater than 5m in height.

All new build development and extensions to existing buildings are required to incorporate bee bricks at a rate of one bee brick per dwelling. Different requirements may be recommended for major applications.

Integrated boxes, which can be a combination of bird, bat and insect boxes, can be provided to support other species. These should target priority species and species of local conservation concern such as insects, house sparrow, starling and bats. An appropriate amount is suggested as follows:

- Major development – 50% of dwellings to incorporate an integrated unit.
- Minor development – 1 integrated unit per dwelling or 100sqm of floorspace.
- Householders – 1 integrated unit.

Further policy is being prepared through City Plan Part Two to positively support the incorporation of swift boxes/bricks and bee bricks in suitable new development. All new build, refurbishment, and renovation schemes should incorporate swift boxes and bee bricks where possible ensuring their installation follows best-practice guidance.

Recommendation: Local planning Authorities should introduce standard planning conditions and policies to deliver low cost/no regret biodiversity enhancement measures in new development as appropriate, such as bee bricks, swift boxes and hedgehog highways.

iii. Design codes, guides and placemaking principles

Non-strategic policies can provide a vital hook for local design guides, masterplans, or codes that can set more detailed requirements. They can also set out how other design tools are expected to be used in appropriate circumstances, such as design review.

Recent UK policy developments aiming to promote higher-quality design outcomes in new development, including the work of the Building Better Building Beautiful Commission, have emphasised the potential role of design codes in delivering beautiful, popular, high-quality development. The Housing Design Audit 2020 found that, in securing good design outcomes, the most effective tools were site-specific design codes and design review. Schemes that benefitted from the use of site-specific design codes were almost five times more likely to appear in the 'good' or 'very good' categories, whilst schemes that benefitted from the advice of a design review panel were nearly four times more likely. Less effective, but still valuable, were projects designed within the parameters of specific guidance such as Manual for Streets.

Sustainability is a central pillar of high quality, beautiful placemaking, including both climate resilience and biophilic design, as recognised in the National Model Design Code, National Model Design Guide and by the Building Better Building Beautiful Commission. Design codes, guides and masterplans offer a valuable opportunity to integrate ambitious local sustainability standards and requirements.

Design codes are a set of illustrated design requirements which provide the specific, detailed parameters for the physical development of a site or area. They can be commissioned or prepared by either the local planning authority or developer, but are best prepared in partnership to secure agreed design outcomes and maintain viability – particularly across complex sites and phased and multi-developer schemes. Design codes can be applied to all development types including larger sites, small sites, residential, commercial, mixed use, open space, landscape or public realm requirements. They can be adopted as a supplementary planning document, or appended to a Neighbourhood Plan, Community Right to Build Order, or Neighbourhood Development order.

In England, the National Planning Policy Framework was amended to stipulate that all areas should produce their own, chiefly area-based codes or guides, based on the principles set out in the National Model Design Code and National Design Guide. With intended support in legislation through the draft Levelling up and Regeneration Bill, both the National Design Guide and the National Model Design Code are to be considered material considerations in planning decisions, and should also be specifically used to guide decisions on applications in the absence of locally produced design guides. Design codes are most valuable in setting clear development expectations, design parameters, principles and required outcomes. They can also include expectations around standardised assessment methodologies and delivery mechanisms, such as establishing clear benchmarks or metrics.

Design guides set out more general design principles and standards that development proposals should follow in an area, building on policies in the development plans prepared by local planning authorities and neighbourhood planning groups.

In England, they are one of the tools the National Planning Policy Framework expects authorities or neighbourhood planning groups to prepare and use to deliver good design. Local design guides should be informed by the National Design Guide and need to be shaped by a clear understanding of the local area's qualities and opportunities. Good local design guides are concise, positive documents which are accessible and use tools such as illustrations and checklists to highlight key design issues and possible solutions. They are most effective when used alongside other relevant design tools to assess design quality. To be given as much weight as possible in the decision-making process, local design guides need to be adopted as supplementary planning documents or appended to a neighbourhood plan.

Masterplans set the vision and implementation strategy for a development and are most likely to be produced by local authorities or developers. They are distinct from local design guides and focus on site specific proposals such as the scale and layout of development, mix of uses, transport and green infrastructure. More specific parameters for the site's development can be set out in a site-specific design code, which can accompany the overall masterplan.

For local authorities, masterplans can help to clarify design expectations early in the planning process, set a clear vision for the site, inform infrastructure and viability assessments, and identify requirements for developer contributions or other investment. Developers may produce a masterplan to help evolve their own vision for a site, assess options, engage the local planning authority and community in pre-application discussions and support an outline planning application.

A range of other plans and technical reports may be needed alongside a masterplan, to provide supporting evidence and set out related proposals, such as a local character study, landscape assessment, transport assessment and proposals for securing biodiversity net gain. An implementation strategy could also be included, especially where development is expected to be brought forward in several phases.

Masterplans benefit from a collaborative approach between the local planning authority, site promoters and local communities so that aspirations and constraints are understood early on. Masterplans produced by local planning authorities may also be adopted as supplementary planning documents to give them weight in decisions on applications.

Case Study: RSPB/ RTPI NBS design code

The Royal Town Planning Institute, in collaboration with the RSPB, have **developed** a triad of design guidance documents aiming to explore how to integrate net zero and ecological recovery in the design coding process.

The project produced two model Design Code publications at both a district and site level, accompanied by a wider summary report: '*Cracking the Code: How design codes can contribute to net-zero and nature's recovery'*. All three documents are targeted at built environment organisations; and explore how to weave multidimensional sustainability considerations into existing the coding process. Contrary to existing government guidance, the design codes attach greater importance to

'ecological recovery' than visual aesthetics outlining 'green Infrastructure planting principles', how to monitor operational and embodied carbon, and create 'whole life carbon assessments'.

The District Design code uses a fictional case study example, 'Monteshire', to provide a practical demonstration as to how Net-Zero and Nature agenda can be interwoven throughout the design process, using the National Model Design Code framework. The report explores eight baseline themes, key to reaching national climate targets from carbon to mobility and transport. Regionally specific characteristics are identified for each topic, including the contiguous barriers to reaching sustainable design highlighted through stakeholder discussions, accompanied by potential solutions. 'Critical Success Factors' are also incorporated into the future vision of the case study which ensures an outcome that successfully mirrors the ambitions of UN sustainability goals.

A similar approach is replicated in the site level design code publication, using a fictional example to demonstrate how communities and officers should assess proposed development and ensure delivery aligns with sustainability principles. An initial site-wide ecological analysis predeceases a series of optimal sustainable design principles recommendations concerning neighbourhood density, green Infrastructure, mobility and 'clean' power.

UKGBC's recent report "*Building the Case for Net Zero: A case study for low-rise residential developments*", examines the design and cost implications of minimising embodied carbon, whilst simultaneously promoting biodiversity and resilience for a real-world, low-rise residential scheme in Southwest Cambridgeshire. It shares valuable insight into the role master planning – such as roads, utilities and energy infrastructure – can play in the wider transition to net zero, biodiversity and resilience enhancement.

The report includes a range of simple and cost-effective interventions for reducing embodied carbon, enhancing resilience and biodiversity that can be implemented today through master planning. These include:

- minimising parking area to embrace the shift towards vehicle sharing,
- the use of swales to reduce stormwater drainage,
- switching from asphalt to low carbon, permeable paving.

Recommendation: nature-based solutions and landscaping level solutions should be prioritised within master planning, to enhance the climate resilience and biodiversity of development. Such as replacing hard surfaces with soft landscaping and trees, which can reduce embodied carbon whilst also delivering increased biodiversity net gain and a reduction in flood risk.

Case Study: West Midlands CA Placemaking Charter

Focusing on the concept of 'placemaking', the West Midlands combined authority take a community-centric approach to form a series of planning guidelines to assist the delivery, design and management of more inclusive spaces.

The published 'Design Charter' exercises creativity and innovation to inspire a more authentic creation of public space which greater reflects the needs of local communities. The charter is underpinned by six central themes.

1. Enhancing local character by identifying key sites of social and historical heritage.

2. Improve the connectivity and mobility of regional districts while promoting sustainable modes of transport.
3. Create 'future proof' cities by incorporating climate resilience and adaptation measures into the design process
4. Improve health and wellbeing by Increasing access to open spaces and using mechanisms to reduce social Isolation.
5. Ensure multidimensional and diverse local characteristics are communicated across all stakeholders through the design process.
6. Ensure investment and regeneration projects are coherent with Inclusive design principles which enhance social value.

Authority-wide design codes - if they are clear, focussed, and measurable - can offer useful resource for designers and developers when they design sustainable schemes and help authorities when they evaluate them. In recognising authority-wide design problems, authority-wide codes can help to coordinate area-based and site-specific codes and will be of value in the absence of capacity to take a site-specific approach.

Whilst code-based compliance checklists and performance targets provide a valuable role in encouraging development managers to challenge poor schemes and evaluate design proposals, development managers may need up-skilling to help support a more proactive role. Evidence indicates delivering better design outcomes requires more than a just check against a list of design principles, and ideally involves a proactive, site-specific process of guidance and peer review. Design governance processes should ideally be applied consistently beyond just when a masterplan is initially drafted, and through all reserved matters applications and development phases.

Authority-wide codes can act as a useful framework for more detailed design codes prepared for specific areas or sites. This can and should be made explicit by authorities when drafting their new authority-wide design codes, ***by including a simple requirement that a site-specific design code is prepared for every major housing application, building upon, and delivering the provisions in the authority-wide code***.

Further recommendations, guidance and advice for authorities developing sustainable design codes - derived from recent pilots, research, and experiences - includes the following.

- Build a better understanding of local design and development issues through post-completion analysis of recent developments.
- Meaningfully engage with local residents (see UKGBC's social value guidance).
- Engage with key parties early, most notably highways authorities, local developers and other neighbouring authorities.
- Reinforce design quality expectations across scales.
- Ensure the right design hooks are implemented in policy. engage developers early in the coding process and in tangible ways relating to their actual investments, rather than on abstract principles.
- Fundamental design qualities relating to the form, layout and use of new development that need to be prioritised early as they impact on viability.

- Character areas / area types can be complex and overlap, and certainty needs to be balanced with flexibility and creativity.
- To define 'character' and beauty, prioritise tangible issues such as landscape, density, height and building line as the enduring qualities of places.
- Use clear, strong language, illustrations and protocols to help readers to understand the relative importance of different elements within, and set clear expectations well in advance codes.
- Establish or externally commission a design review panel as a chargeable service, with a policy requirement. All major housing projects should be subject to a programme of design review. Advice on how to do this can be found in Reviewing Design Review.

Recommendation: Design codes, guides, masterplans and placemaking initiatives should seek to reflect best-practice examples and guidance, prioritising nature-based landscaping level solutions to enhance the climate resilience and biodiversity of development.

For ambitious authorities, requirements should be set that a site-specific design code is prepared for every major housing application, building on and delivering the provisions in an authority-wide code. A design review panel should be established with a policy requirement and all major housing projects should be subject to a programme of design review.

iv. Targeted adaptation Policies

Although climate resilience benefits will often be delivered through green infrastructure or biodiversity enhancements, some targeted resilience benefits can only be achieved through specific interventions or require dedicated action to ensure they are delivered. Where certain areas are especially vulnerable specific risks, it is valuable for authorities to consider targeted interventions or how to maximise distinct resilience benefits as part of wider best practice.

Overheating

UKGBC's report, 'A Framework for Measuring and Reporting of Climate-related Physical Risks to Built Assets' provides a detailed overview of the potential risks facing the built environment during periods of extreme heat. The report also recommends specific modelling tools, to complete detailed forms of risk analysis for both current and future climate scenarios.

In England, new building regulation requirements to mitigate the risk of overheating in new homes in building regulations (Part O) came into force on 5th June 2022. Similarly, updated regulations apply in Scotland from December 2022 and in Wales from November 2022.[12] Regulations currently apply to specified residential buildings only.

[12] Wales: https://gov.wales/building-regulations-guidance-part-o-overheating
Scotland: https://www.gov.scot/policies/building-standards/monitoring-improving-building-regulations/
England: https://www.gov.uk/government/publications/overheating-approved-document-o

There are currently two main ways to calculate overheating risk in order to comply with overheating regulations in England, Scotland and Wales:

- A Simplified Method
- Dynamic Thermal Modelling

In all three Nations, the simplified method specifies measures to adequately mitigate the risk of summer overheating through limiting solar gains and other means of removing excess heat. A compliance checklist is included to demonstrate compliance to Building Control. In England, it can be used for moderate and high-risk areas for overheating, and the Approved Document contains a step-by-step guide, as well as postcode lists for high-risk areas. Currently the 'high risk' categorization in the simple methodology currently only includes London, and not other conurbations (save a limited reference to possible application in greater Manchester) limiting the application of the associated high-risk measure specifications.

The Dynamic Thermal Modelling approach can be used for more complex buildings and where greater accuracy and interpretation is required. Building simulation software can be used alongside guidance (such as CIBSE TM52 and TM59) to accurately replicate the form of the building and map it against the potential overheating on a seasonal or hourly basis. Potential overheating risk in specific rooms can be calculated for specific times of the day. It is also possible to model different mitigation methods such as glass coatings, shading and shutters or blinds to work out their efficacy.

UKGBC supports the simplified method(s) for small developers and small to medium risk areas (due to burdens of complexity). The use of the Dynamic Thermal Modelling method is supported for larger developments, or for developments in areas of high risk (such as London, and, crucially, other conurbations).

Measures to mitigate overheating can include specific building standards as well as landscape interventions as part of a place-based approach.

The cooling hierarchy (see **London Plan** *below*) seeks to reduce any potential overheating and the need to cool a building through active cooling measures. Air conditioning systems can be a resource intensive form of active cooling, increasing emissions, and emitting large amounts of heat into the surrounding area. By incorporating the cooling hierarchy into the design process, buildings will be better equipped to manage their cooling needs and to adapt to the changing climate they will experience over their lifetime.

Recommendations: Authorities should introduce polices and requirements to directly combat overheating in new development including:

- ***Demonstrating compliance with the cooling hierarchy (see London Plan) and best-practice guidance.***
- ***Require the use of the TM52 and/or TM59 dynamic thermal modelling approach in relation to key building typologies and heating systems, where there is a higher risk to occupants of overheating, using the latest weather datasets for current and future temperatures (e.g. Design Summer Years).***
- ***Deliver multifunctional green infrastructure in line with best-practice recommendations, such as tree canopy cover targets [see above]***

- ***Include policies to discourage excessive use of hard surfacing and encourage soft landscaping [see below]***
- ***Introduce policies to look favourably on the installation of low-regret adaptation measures, such as the installation of external shutters, awnings, and blinds.***
- ***Apply the high-risk simplified approach for areas identified as at risk outside of London.***
- ***Require a Sustainability Statement be submitted to demonstrate compliance with the above, including the use of a locally developed, or nationally recognised screening tool such as BRE's temperature reporting tool, currently used as part of the Home Quality Mark or the Passivhaus Planning Package (PHPP) to screen for a high overheating risk and the potential need for further measures.***

Stretching requirements:

- ***All large developments should implement a soft landings approach from 'Phase 1: Inception and Briefing' as per BSRIA BG 54/2018 Soft Landings Framework 2018, to ensure any building requirements set at the beginning are maintained throughout the project from inception to completion and beyond.***
- ***All developments shall put in place a recognised monitoring regime to allow the assessment of energy use, indoor air quality and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy, and ensure that the information recovered is provided to the applicable owners and the planning authority.***

Case Study: London Plan

London Plan - Policy SI 4 Managing heat risk

A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following **cooling hierarchy:**

1. Reduce the amount of heat entering a building through orientation. shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.
2. Minimise internal heat generation through energy efficient design.
3. Manage the heat within the building through exposed internal thermal mass and high ceilings.
4. Provide passive ventilation.
5. Provide mechanical ventilation.
6. Provide active cooling system.

In line with Policy G1 Green infrastructure and Policy G5 Urban greening, plans should incorporate forms of nature-based design such as street trees and green roofs to maximise shade and evapotranspiration.

The Chartered Institution of Building Services Engineers (CIBSE) has produced guidance on assessing and mitigating overheating risk in new developments, which can also be applied to refurbishment projects. TM59 should be used for domestic developments and TM52 should be used for non-domestic

developments. In addition, TM49 guidance and datasets should also be used to ensure that all new development is designed for the climate it will experience over its design life.

Case Study: Milton Keynes

Milton Keynes Local plan - **Policy SC1: SUSTAINABLE CONSTRUCTION**

A. Development proposals will be required to demonstrate how they have implemented the principles and requirements set out below. With the exception of requirements K.2/3/5, non-residential development of 1000 sqm or more that is demonstrated to achieve a BREEAM Outstanding rating will not be require to meet the requirements below.

1. Calculate Indoor Air Quality and Overheating Risk performance for proposed new dwellings.
2. Implement a recognised quality regime that ensures the 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating risk) matches the calculated design performance of dwellings in 4) above.
3. Put in place a recognised monitoring regime to allow the assessment of energy use, indoor air quality, and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy, and ensure that the information recovered is provided to the applicable occupiers and the planning authority.

Case Study: Greater Cambridge

Greater Cambridge Local Plan - Policy CC/DC: Designing for a changing climate -

All new dwellings must be designed to achieve a low overheating risk using the Good Homes Alliance Overheating in New Homes Tool and Guidance, with more detailed modelling required for schemes identified as being 'at risk', using future climate scenarios such as those provided by 2050 Prometheus weather data for Cambridge (note, this may be subject to future amendment). All non-domestic buildings must be designed to achieve a low overheating risk using the cooling hierarchy, with more detailed modelling required for major developments using future climate scenarios such as those provided by 2050 Prometheus weather data for Cambridge.

All developments should take a design-led approach to climate change adaptation with approaches integrated into architectural design. For overheating, proposals should follow the cooling hierarchy.

All development proposals must utilise site wide approaches to reduce climate risks, including the integration of sustainable drainage systems as part of landscape design, the use of cool materials and urban greening, for example through increased tree canopy cover and an enhanced treescape and integrating green spaces into new developments.

For further detailed guidance on overheating, see:

- Good Homes Alliance (2019). Tool and guidance for identifying and mitigating early stage overheating risks in new homes.
- Islington Borough Council (2012) Low Energy Cooling. Good Practice Guide 5.

Flooding

Planning policy can help tackle flood risk through avoidance alongside both hard and soft mitigation solutions.

In England, The NPPF states that inappropriate development should directed away from areas at highest risk (existing or future). If development occurs in such areas, it should be *'made safe for its lifetime'* without increasing flood risk elsewhere. Residential development can be assumed to have a lifetime of at least 100 years, non-residential is assumed at 75.

Recent **planning practice guidance on flooding and coastal change** emphasises the importance of avoiding all sources of flood risk over subsequent control, mitigation, and residual impact management. Local Planning Authorities are encouraged take an integrated approach to flood risk management, using a collaborative, catchment-based approach to delivering coordinated management of water storage, supply, demand, wastewater, flood risk, quality of water and the wider environment, drawing on key strategies and evidence.

Strategic policies should be informed by a **strategic flood risk assessment** and should manage flood risk from all sources. Plans should apply a sequential, risk-based approach to the location of development. When determining planning applications, authorities should ensure that flood risk is not increased elsewhere, supported by a **site-specific flood-risk assessment** demonstrating how flood risk will be managed over the development's lifetime and taking climate change into account.

If development is allowed in areas at risk of flooding, in light of such assessments (including the sequential and exception tests, as applicable) it must currently be demonstrated that the development is appropriately flood resistant. Planning guidance on defining flood resilience and resistance has recently been provided, however, in both England and Wales, there are currently no specific requirements in Building Regulations Part C for flood resilience measures, other than signposted measures and guidance that may be used.[13]

Emergency plans will be essential for sites at risk of flooding and will need to take account of the likely impacts of climate change. In consultation with emergency planners and services, the local planning authority will need to ensure that agreed **emergency plans** are secured and implemented through appropriate planning conditions or planning agreements.

In Scotland, Mandatory Standard 3.3 requires every building must be designed and constructed in such a way that there will not be a threat to the building or the health of the occupants as a result of flooding and the accumulation of groundwater. 'Planning and Building Standards Advice on Flooding' (PAN 69) sets out flood risk and probability assessment procedures including the need for drainage assessments to demonstrate a neutral or better effect on sites where flooding is an issue. For site specific flood risk assessments, the CIRIA document 'Development and Flood Risk – guidance for the construction

[13] Improving the flood performance of new buildings – Flood resilient construction, Communities and Local Government, Defra and the Environment Agency, May 2007.

industry' (C624) 2004 provides detailed guidance on carrying out flood risk assessment and suggests design considerations for developers.

Recommendation: Local planning policy should include clear requirements for property flood resilience measures to be included in development located in at-risk areas. These measures should be specified and installed in accordance with the industry Code of Practice for property flood resilience.

The property flood resilience code of practice

The Code of Practice for property flood resilience was initiated through DEFRA's Property Flood Resilience Action Plan to help improve standards and restore market integrity. CIRIA together with a consortium led by BRE is managing a project to develop a robust and authoritative code of practice (CoP) and consolidated guidance that provides a standardised approach for the delivery and management of PFR. The Code sets out a framework for homeowners, designers, and planners who want to implement resilience measures. The framework for the Code is based around six standards, representative of best practice.

1. Hazard assessment – completion of a Flood Risk Assessment (FRA), proportionate to level of risk and size of the property.
2. Property survey – determination of the construction type of the property, its current level of flood resilience, ground conditions and options for drying and decontamination.
3. Options development – identification and consideration of the most appropriate options to restrict water entry and to make the building more recoverable.
4. Construction – completion by a qualified person and undertaken to deliver the benefits identified within the options development standard.
5. Commissioning and handover – demonstration that the measures installed will operate efficiently and as designed. Preparation of a handover pack to allow the nominated person to deploy the system.
6. Operation and maintenance – justification that the measures installed remain suitable and are maintained appropriately so they can be deployed efficiently following a flood event.

In addition to property-level interventions, such as waterproofing, resilient materials and flood doors, a broader place-based approach is critical to appropriately mitigating local flood risk. Excessive use of hard surfacing in particular represents a significant hazard through increased surface run-off, increasingly exacerbated by the occurrence of extreme rainfall events.

To help to alleviate flooding by slowing and storing rainfall, planning policies should prioritise the use of nature-based solutions, soft landscaping, and sustainable drainage systems.

Sustainable Drainage Systems (SuDS) work best as part of an Integrated Water Management (IWM) approach, which coordinates the management of water across the natural and built environment. SuDS should prioritise a Natural Flood Management (NFM) approach that work with natural processes to slow, store and filter water, whilst also creating valuable habitats. the use of hard SuDS, such as subsurface geocellular storage, should be discouraged, as the highest quality SuDS not only manage water quantity, but also enhance biodiversity, and provide amenity and health benefits as part of a multi-functional approach.

Schedule 3 of the Flood and Water Management Act (FWMA) calls for the mandatory use of SuDS in new developments. In January 2019 the Welsh Government introduced legislation that required SuDS for developments of more than one dwelling built in accordance with statutory SuDS standards. Similar legislation has not been enacted in England, and adoption of SuDS on a voluntary basis has been slow. 2018 Revisions to the National Planning Policy Framework require the use of SUDS on major developments and within areas at risk of flooding. However, the specification of SuDS is still delivered through local policy on a non-statutory basis, using DEFRA's Non-Statutory Technical Standards. There remains wide variability in local SuDS policy across England.

Considering appropriate SuDS for new developments should be undertaken as early as possible in the planning process. Applicants should be required to submit a **sustainable drainage strategy** as part of their planning application (including outline applications), having regard to the nature and scale of the development proposed. Where a site-specific flood risk assessment is required, it may be appropriate to combine the two. Local planning authorities should consider setting out requirements for supporting information on sustainable drainage systems as part of their local list of information requirements.

SuDS should follow the design methodology set out within the **SuDS Manual**. This involves setting 'strategic surface water management objectives' to comply with local and national policies, before refining the scheme through conceptual, outline, and detailed design stages. SuDS components should be selected to ensure they are appropriate to the characteristics of both the site (e.g., topography, geology, watercourses) and the proposed development (e.g., infrastructure, building design, maintenance arrangements). The local authority will need to consider whether the proposed standard of construction would enable adoption and maintenance by an appropriate body, such as the water and sewerage company, under the Ofwat-approved Sewerage Sector Guidance.

The Simple Index Approach (SIA) Tool can be used by design teams to check the sufficiency of proposed SuDS components in mitigating water quality risks to receiving water bodies and establish the relevant 'Design Conditions' necessary to manage each inflow or 'runoff area' on a site-by-site basis. With appropriate cross referencing to the relevant 'Design Conditions' the tool can be used for all the UK. Checklists have also been produced as part of the Manual, on key topics which can be including SuDS planning and design process, a swale checklist, a pervious pavement checklist and more,

We recommend that:

- ***Local policies should require the use of sustainable drainage systems (SuDS) on all development over one dwelling, including requirement for SuDS systems to incorporate multi-functional benefits (as set out within the SuDS Manual).***
- ***Policies should require surface water management features should be designed in accordance with the nationally described Hierarchy of Drainage and the most recent edition of the CIRIA SuDS Manual, CIRIA (C713) Retrofitting for surface water management and DEFRA's technical standards on sustainable drainage systems.***
- ***Policies should be introduced to discourage development with significant levels of artificial surfacing and instead, look favourably on plans involving significant soft landscaping, green infrastructure and solutions such as permeable paving.***

Case Study: Borough of Kensington and Chelsea

The Borough of Kensington and Chelsea (BKC) 2019 Local Plan, outlines the local infrastructure design strategy for 2028. The council have noted a near 20% increase in the number of impermeable surfaces within 40 years, making measures to address draining increasingly vital. Identifying a localised risk of tidal and groundwater flooding, Policy CE2 specifies the boroughs flood mitigation plan to both reduce risk and address potential implications.

Policy CE2 Flooding: Flood risk and Sustainable Drainage systems

a) Dispute of all new developments within higher risk zones, and additional enhancements to existing infrastructure which would increase vulnerability, i.e., basements.
b) Proposed development in critical drainage areas will require a 'Sequential Test' and a Flood Risk Assessment
    a. architecturally, safety measures in the circumstance of flooding are factored into design.
c) A proposed increase greenfield development to reduce water run off quantity by '50% of existing rates' primarily through SUDS.
d) To ensure the successful execution of SUD systems, it advised to consult the DEFRA non-statutory technical standards, retrofit existing SUD assets, and acknowledge the holistic benefits of increasing greenfield cover.

Case Study: Brighton

Brighton City Plan Part Two - DM43 Sustainable Drainage

The design and layout of all new buildings, and the development of car parking and hard standing, will be required to incorporate appropriate Sustainable Drainage Systems (SuDS) capable of ensuring that there is a reduction in the level of surface water leaving the site unless it can be demonstrated not to be reasonably practicable.

SuDS should be sensitively located and designed, in line with recognised best practice* and in accordance with the Sustainable Drainage SPD to ensure that the quality of local water is not adversely affected. It should provide, where possible, improved biodiversity, an enhanced landscape/townscape and good quality spaces that improve public amenities in the area.

Details of the proposed SuDS should be submitted as part of any planning application including provision for arrangements for the whole life management and maintenance of the provided SuDS.

* Including **CIRIA (2015) The SuDS Manual** and BHCC and partner authorities: Water, People, Places – A guide for master planning sustainable drainage into developments.

Find more information here.

For further best-practice guidance, see:

- TCPA Planning for Flood Risk (England)
- The RSPB and WWT Sustainable Drainage Systems (2012) report, is also a useful guide on the range of SuDS available and their use in relation to wildlife and amenity benefits
- Defra Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) - WT15122
- CIRIA 'Delivering better water management through the planning system' (C787F)

Water use and drought resilience

Water use in the UK built environment is currently significantly above the recommended pathways of the National Infrastructure Commission and Water UK for securing future water supply resilience. At least 3,300 million litres per day of additional capacity in the water supply system will be required to maintain current resilience by 2050, and the NIC recommend two thirds of this capacity should come from demand management measures, including for buildings.

In England, Part G of building regulations requires new homes to have a water consumption standard of 125 litres per person per day and local authorities can introduce a more ambitious requirement of 110 lpppd. In a recent Ministerial Statement, following a consultation on reducing personal water use, the Government encouraged local authorities to adopt the 110 lpppd standard. Compliance can be achieved through use of the water efficiency calculator or a derived fittings-based approach, including maximum fittings consumption values.

In Scotland, buildings must be designed and constructed in such a way that sanitary facilities are designed for the prevention of undue consumption of water with water efficient fittings; however, this standard applies only to dwellings. Minimum flow and flush requirements a specified for a range of fixtures including WC cisterns and taps. Minimum requirements for the silver sustainability level include additional shower flow requirements and a water butt with a minimum capacity of 200 litres if there is a garden. At gold level, in addition to a water butt, three out of five further water efficiency measures must be included, such as a water metre, lower flow and flush volumes, and/or rainwater harvesting systems or greywater recycling systems.[14]

In Wales, the potential consumption of wholesome water must not exceed 110 litres per person per day, or; (b) where a dwelling is formed by a material change of use of a building within the meaning of regulation, 125 litres per person per day. This must be measured in either case in accordance with a methodology approved by the Welsh Ministers.

We recommend that:

- ***Local authorities (in England) adopt the 110 lpppd standard.***
- ***Authorities should introduce policies to encourage or look favourably on rainwater/ greywater harvesting technology.***

UKGBC supports more ambitious water efficiency targets nationally, in line with the 2030 RIBA challenge, 95 lpppd by 2025 and 75 lpppd by 2030. This goes beyond what Local Authorities are currently able to require, as per the Deregulation Act 2015. However, the need for more ambitious targets is becoming increasingly evident, particularly in areas with increasingly severe and reoccurring water stress and supply issues, such as Southeast England.

Where bespoke arrangements or partnerships, such as the Ox-Cam Arc, are being developed, and the government has encouraged partner authorities to exceed minimum standards in by building

[14] https://www.gov.scot/publications/building-standards-2017-domestic/3-environment/327-water-efficiency/

regulations, authorities should aim to integrate more stretching standards on issues such as water consumption.

Case Study: West Sussex County

Biodiversity degradation within three key sites of special protection and conservation have been linked with water abstraction in Sussex Water Supply Zone as part of the Arun Valley.

This has prompted Natural England (NE) to publish a statement advising all development must actively prevent further harm, and "the issue should be resolved in partnership through Local Plans across the affected authorities".

To control and regulate rates of extraction, West Sussex County have proposed the submission of a 'water neutrality statement' as part of all new planning applications in line with NE standards while the region remains at risk.

Water neutrality mitigates against negative implications to local wildlife directly linked to hydrogeological health, and is defined by Natural England as follows:

> *"For every new development, total water use in the region after the development must be equal to or less than the total water-use in the region before the new development."*

Likely to become a mandatory asset for the validation of construction, the statement will require developers to demonstrate 'water neutrality' through:

1. Evidence based assurances that new infrastructure will not increase the baseline level of water abstracts rates, aligned with Natural England's guidelines.
2. A calculated 'water budget' of current and estimated future water consumptions rates.
3. A detailed proposed mitigation strategy to prevent over extraction "through a combination of water efficiency, water recycling and offsetting measures".

This applies to all new development types (commercial and residential) which utilise public water in the Southern Water's Sussex North water supply zone. These new measures aim to ensure planning does not compromise future biodiversity and aligns with The Conservation of Habitats and Species Regulations 2017. Examples of efficiency measures are provided in a supporting study for Crawley Borough Council.

Case Study: Greater Cambridge (Draft Policy at time of publication)

Policy CC/WE: Water efficiency in new developments
Developments will be required to meet high standards of water efficiency:

- Residential developments should be designed to achieve a standard of 80 litres/person/day unless demonstrated impracticable.
- Non-residential development will be required to achieve full credits for category Wat 01 of BREEAM unless demonstrated impracticable.

The Greater Cambridge Integrated Water Management Study (2021) has shown that the current level of water abstraction from the chalk aquifer is widely believed to be unsustainable, with potential to cause environmental damage, unless abstraction rates are reduced significantly to safeguard natural river flow. Whilst water company plans have taken account of planned growth in the existing local plans, there is no environmental capacity for additional development in the new to be supplied by water

by increased abstraction from the chalk aquifer. Future water demand and supply will need to be balanced in other ways, such as demand reduction.

The current Local Plan policies require 110 litres/person/day, which is the lower optional requirement. It is proposed to go further than that and include a policy requiring 80 litres/person/day in all new housing development. This is the equivalent of the Code for Sustainable Homes Level 5/6 (now withdrawn) and which was the design standard for the University's development at Eddington in North West Cambridge. An equally water efficient level is proposed for non-residential developments of full credits for category Wat 01 of BREEAM (the current level in Cambridge Local Plan policy).

The Integrated Water Management Study (IWMS) has shown that 80 litres/person/day is achievable by making full use of water efficient fixtures and fittings, and also water re-use measures on site including surface water and rainwater harvesting, and grey water recycling. It also shows that the cost effectiveness improves with the scale of the project, and that a site-wide system is preferable to smaller installations. Increased standards of water efficiency for Greater Cambridge are also supported in principle by Cambridge Water, Water Resources East, and the Environment Agency.

The Shared regional principles for protecting, restoring and enhancing the environment in the Oxford-Cambridge Arc are clear that they will encourage local partners to exceed minimum standards required by building regulations on issues such as water consumption, and that they will be working with Government on this issue.

Case Study: Eastleigh Borough Local Plan 2016-2036

The Borough of Eastleigh, Hampshire, currently relies on resource abstraction from Southern Water; an area which has been marked by the Environment Agency, as experiencing 'extreme water stress'. Estimates calculate an approximate 50% increase in local water demand by 2070, the Council in response have set ambitious water targets in the Eastleigh Borough Local Plan 2016-2036. A focus on water management is addressed in three separate policies and supported by a background evidence paper.

1) **Policy DM2: 'Environmentally Sustainable Development'**
   a) *'All new residential development must have a water consumption rate of no more than 110 litres per person per day.'*
   b) *'New residential development and all non-residential and multi-residential development creating more than 500m2 floorspace of no more than 90 litres per day'*

2) **Policy DM3: 'Adaptation to Climate Change'**
   a) ***'To adapt to water stress, new development should be designed to reduce demand'***
   b) *Advised measures in the plan include:*
      i) *Reduced residential mains water consumption (as per policy DM2)*
      ii) *Water efficient appliances, fittings and leak detection devices for non- residential and multi-residential development*
      iii) *Rainwater harvesting and grey water recycling*
      iv) *Drought resistant landscape design*

3) **Policy DM10: 'Water and Waste Water'**
   a) Policy DM10 Indirectly addresses issues of water scarcity through the regulation of local ecological health. To ensure

(1) the delivery of new development alongside the completion of enhancements to the water supply or waste water infrastructure should this prove necessary at 'project level stage' to ensure compliance with the provisions of the Habitats Regulations'

The plan utilises a long-term approach as advised by with national policy guidelines, and is clear such enforcement will 'not adversely affect development viability or housing supply'.

v. Biodiversity net gain and environmental net gains

To deliver measurable improvements for biodiversity in relation to new development, both local planning and national policies have increasingly focused on the concept of biodiversity net gain.

Biodiversity net gain (BNG) requires measurable biodiversity improvements through creating or enhancing habitats in association with development. Biodiversity net gain can be achieved on-site, off-site or through the purchase of statutory BNG credits as a last resort. BNG is already required through national planning policy in England and Wales.

In England, the Environment Act 2021 will require all development, with a few exceptions, to deliver 10% biodiversity net gain from November 2023. BNG will be measured using Defra's biodiversity metric (either the full or the small sites metric) and habitats will need to be secured for at least 30 years. To demonstrate compliance, a biodiversity net gain plan must be submitted, and Defra are currently developing an associated net gain habitat management plan and reporting template. The statutory metric (version 4.0) will be based on updates to biodiversity metric 3.1 and the small sites metric currently under consultation.[15]

More guidance on the development and proposed BNG process in England is available here:

- Biodiversity net gain for local authorities - LGA
- Natural England Biodiversity Net Gain brochure explainer
- Natural England's Introduction to Biodiversity Net Gain on YouTube.

In Wales, NI, and Scotland, BNG is not yet being proposed as a legal requirement.

The Welsh government aims to publish its BNG strategy by 2023 as part of its Nature Recovery Action Plan. Planning Policy Wales provides specific guidance on how local planning authorities should comply with the Section 6 duty to enhance biodiversity, outlining in detail the practical options which do not include a tariff as proposed in England. However, this does not include specified metrics or a particular target level of enhancement, leaving judgement as to whether proposed developments meet the requirements to local planning authorities on a case-by-case basis.[16]

The recent Planning (Scotland) Act 2019 introduced a new requirement to consider how the planning and development process can best contribute to the enhancement of Scotland's biodiversity. National

[15] https://consult.defra.gov.uk/defra-net-gain-consultationteam/technicalconsultation_biodiversitymetric/
[16] https://gov.wales/biodiversity-enhancements-guidance-heads-planning

Planning Framework 4 (NPF4) currently under consultation, proposes local development should only be supported if it includes appropriate measures to enhance biodiversity and minimise harm, in proportion to the nature and scale of development. While it indicates enhancements should include supporting nature networks, linking to and strengthening habitat connectivity, no specific metric or target is specified. NatureScot has published for comment new draft guidance: Developing with Nature to inform 'appropriate measures' to enhance biodiversity for certain local and non-EIA development. It provides advice on 23 such measures, including managing water with nature, providing homes for nature and planting for nature.

The use of a standardised approach and metric is valuable for both developers and local authorities in ensuring the delivery of measurable outcomes. UKGBC supports the use of the updated Defra metric and associated small sites metric, together with the required involvement of a qualified ecologist for sites using the full metric.

In England, once the mandatory requirement for BNG is in place, there will be no technical need to repeat the legal requirements in local policy. However, there is still an important role for local planning policy, in setting ambitious targets and ensuring best-practice delivery. This includes correcting for some of the deficiencies identified in recent trials.[17] This can be done through setting more ambitious or specific requirements in local planning policy, or more detailed delivery requirements in an SPD.

Several authorities have set requirements for 20% biodiversity net gain, with several UKGBC members having already set organisational commitments or developed sites to exceed 10%.[18] The Future Homes Hub has likewise committed to investigating how offsite offsetting could help increase net gain delivery beyond 10%.[19]

We recommend that *authorities should*:

- ***Introduce a target for development to deliver 20% net gain on large sites, prioritising off-site enhancement linked to local nature recovery priorities, particularly in securing additionality beyond the minimum.***
- ***Ensure that BNG contributes to wider nature recovery plans and strategic objectives, linking to local strategies (see section 2).***
- ***Develop a Supplementary Planning Document to set out details of the preferred BNG delivery approach, including a strategy for achieving the desired balance of on-site off-site delivery. This should include support and specific guidance for delivering appropriate habitats, such as appropriate wildflower species planting.***
- ***Require the delivery of measurable outcomes and associated best practice, including the latest Defra metric(s), or the new British Standard for BNG – BS 8683. This standard identifies the ecological data required and considerations for its assessment, and its use in the design of mitigation measures.***

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[17] Sophus O. S. E. zu Ermgassen, Sally Marsh, Kate Ryland, Edward Church, Richard Marsh, Joseph W. Bull, "Exploring the ecological outcomes of mandatory biodiversity net gain using evidence from early-adopter jurisdictions in England", https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12820

[18] https://kentnature.org.uk/nature-recovery/biodiversity-net-gain/ ; https://www.cornwall.gov.uk/media/ytsowko1/climate-emergency-dpd.pdf

[19] https://www.futurehomes.org.uk/roadmap

- ***Integrate and fully reflect consideration of the mitigation hierarchy***

Recent pilots of BNG have highlighted deficiencies associated with delivering high levels of certain, low value habitats on-site. In order to best secure nature's recovery, it is highly recommended that local authorities develop policies to encourage the desired balance of on-site off-site delivery, ensuring sufficient weighting is given to habitats that support local nature recovery networks at scale.

More detailed guidance on biodiversity net gain best-practice principles for development, including detailed case studies, is available through the CIEEM/IEMA/CIRIA Biodiversity net gain good practice principles for development - practical guide and CIEEM, IEMA CIRIA Biodiversity net gain case studies.

The report **Biodiversity in new housing developments**, commissioned by the NHBC Foundation, with the support of the RSPB and Barratt Developments, outlines design concepts, practical solutions, and illustrative case studies to enhance and protect biodiversity in development greenspace, whilst at the same time helping deliver public benefits, for all stages of development. It includes advice on specific measures and enhancements, such as nesting sites, resilient wildlife-friendly planting, bioretention beds, conveyances, detention basins and balancing ponds.

Case Study: Cornwall Planning for Biodiversity Guide

Cornwall Council's 'planning for biodiversity guide', provides a guiding framework for local planners/developers to successfully integrate contextual biodiversity and the requirements of local/national planning policies into the creation of new development. This was created supplementary to the Local Plan (Strategic Policies 2010-2030) and includes details of Cornwall biodiversity legislation, ecological data requirements in planning applications, and the necessary details which must be submitted as part of planning proposals and how biodiversity enhancement can be achieved.

Policies 22, 23 and 25 of the local plan are used as a baseline for planning guidance to ensure the framework compliments wider statutory targets. Key principles of each policy with detail of 'designated and notable habitats and species' which must be taken into consideration during planning proposals.

Development process:
A comprehensive 5 step process aims to outline how developers can apply biodiversity principles into each stage of the planning application process. This Includes the following:

- **Stage 1: 'Surveys and assessment of impact'**
  During the pre-acquisition stage, advised, is to carry out a habitat survey, deployed ideally through a qualified professional body, to assess the sites ecological characteristics. Further detail as to how organisations undertake such surveys is given; a Preliminary Ecological Appraisal (PEA) advised prior to a 'Phase 1 habitat survey', with specific guidance given to the timings and fauna/flora focal points.
- **Stage 2: 'Assessment of impact and net gain'**
  Cornwall council advise the completion of the following assessments to ensure design decisions enhance the local environment; A Habitat Regulations and Appropriate Assessment, Environmental Impact Assessment, Ecological Impact Assessment and Biodiversity Net Gain (with use of the DEFRA Biodiversity Metric Calculation Tool).
- **Stage 3: 'Design'**
  Stage 3 is framed as an opportunity to ensuring the protection and enhancement of habitat using a design-led approach, which reflect the learnings from stages 1 and 2. The importance of incorporating biodiversity into the early stages of design are emphasised to ensure cost

and labour efficiency, and ensure any potential losses are compensated for early on. Specific mitigation guidance is given for the circumstance of biodiversity enhancement, minimising harm, restoration etc., with further examples of habitat enhancement design techniques, and opportunities to amplify biodiversity through the physical 'built fabric' of infrastructure.

- **Stage 4: 'Construction'**
  Information outlining specifically how developers will protect identified habitats of Importance Is required for the construction stage. This can be achieved through a ' *construction environmental management plans'* (CEMP) Examples of necessary details include construction materials, site offices, site phasing and specific strategies to avoid harm to Individual species types. Recommended Is also the creation of a '*Landscape and Environmental Management Plan'* (LEMP) to demonstrate protection during operational stages. Both CEMP and LEMP plans must detail how contamination and pollution will be minimised.
- **Stage 5 - 'Monitoring, management and enforcement - Once planning permission has been given'**
  To ensure the longevity of previous control measure to enhance and protect on site biodiversity, the plan advises the *'provision for follow up monitoring, management and enforcement'.* In the circumstance new development is Identified to threaten species health, a monitoring programme will be necessary with the support of an ecologist. Mitigation measures must also be agreed by local planning authorities, demonstrated through a *'planning obligation agreement'*.

The planning for biodiversity guide also features an appendices which outlines the context, **species survey methodology**, important local natural features and the role of wider environmental bodies. A series of case studies help to apply the plan's theoretical and technical concepts into 'real life' examples. Details of the *'Langarth Park and Ride*' planning proposal, in line with above guidance, including a site summary, the ' *Ecological Gain Ecological Loss assessment'* and the responsive site-specific design considerations.

Case Study: Conwy Supplementary Planning Guidance LDP5: Biodiversity in Planning

Conwy's Local Development plan outlines the steps necessary during the planning process of new development to assess and mitigate against harm to local biodiversity. The local plan aims to ensure all construction is compliant with **Policy NTE/3 'Biodiversity'** which requires the design of new infrastructure to '*conserve and, where possible, enhance biodiversity',* supporting the Conwy Local Biodiversity Action Plan. Guidance advises planning applications to avoid designated sites of ecological importance and keystone species, prioritise the retention of important habitats before the proposal stages.

Actions are required through the full design process, from pre-application stage through to creating a Biodiversity Statement and obtaining a building license, in order to achieve local and national biodiversity targets.

Case Study: Brighton Biodiversity and Nature Conservation SPD

The SPD describes the biodiversity resource of the city, examples, and requirements for integrating biodiversity into development, and includes a step-by-step guide of the planning process in relation to the consideration of biodiversity. The Annexes provide further details and information on Protected and Priority habitats and species, legislation, survey seasons, hazard prevention, habitat creation, and includes the 'Biodiversity Checklist' which will be a validation requirement for certain types of planning applications.

Requirements include:

- Applications within the B-Lines identified by Buglife should include sustainable landscaping features of value to invertebrates, especially pollinators, including flowering lawns / wildflower grasslands, pollen and nectar rich plants, shrubs and trees.
- Developers should check details of Registered Toad crossings and advice listed by Froglife. This will help avoid direct impacts on known toad breeding populations alongside ensuring the design of raised kerbs and drains/gully pots within the development prevents the fragmentation of commuting routes.
- External lighting must be installed so that it can be clearly demonstrated that lit areas will not disturb wildlife. Guidance Note 08/18 Bats and artificial lighting in the UK (Institute of Lighting Professionals, 2018) provides useful information for sensitive wildlife.
- Bee and swift brick installation requirements.

Authorities can also specify, or encourage, the use of digital tools and third-party frameworks to achieve BNG. Such tools can be useful in expediting the process or providing useful visual information to assess proposals. A list of useful tools is available below:

Tool	Description
Joe's Blooms	Joe's Blooms provides an online platform to guide users through the BNG process. It requires details about the project and site to help determine if it is a 'small site'; determine a relevant 'competent person'; facilitate a legislation-compliant site survey; engage with key stakeholders; collate information about the site, and aide with the accurate filling in of the biodiversity metric and the production of a best-in-class 'Biodiversity Gain Plan' (BGP), whilst incorporating specific local authorities' needs. Joe's Blooms replicates Natural England's Biodiversity Metrics, suggesting interventions for each site on how they can effectively comply with the BNG rules - via both onsite and offsite solutions (as appropriate by LPA). It uses this information to produce a complete BGP, a filled-in metric sheet, and other materials that the developer will need to submit. Reports and metric calculations can be adjusted to reflect feedback from local planning officers. **[Currently under development]**
i-Tree design & biodiversity metric tool	The tool incorporates two stand-alone metrics: ▪ i-Tree Design – Developed by the United States Forest Service, Davey Tree Expert Company and other collaborators. ▪ Biodiversity Metric 2.0 (BM 2.0) – Developed by Natural England. Using a grid reference or similar, the user can find a location and plot a polygon to cover the footprint. Once the user has inputted the planting/landscape design, the tool calculates current ES values and uses them along with the species of tree specified, geographical and climatological data to predict growth rates and model the ES values into the future. This creates the "natural capital breakeven point" i.e., the year at which the new planting will replace the values lost because of the scheme. ES are also quantified (kg) and valued (£). The monetary expression of ES in GBP further illustrates the economic, environmental and community gains of projects in a format which is

	digestible by those who work in construction design through to local councillors and those who reside and work in local communities. Available here.

Environmental net gain

Environmental Net Gain (ENG) aims to follow the same principle as biodiversity net gain, in terms of deliverable measurable enhancements, but requires developers to deliver a wider range of environmental benefits over and above the full environmental impact of the proposed development (e.g. air quality, flood risk management). However, it is recommended that local authorities develop and test BNG principles, prior to Implementing ENG, and any ENG is additional to BNG requirements.

In England, the 25-Year Environment Plan committed the Government to exploring the potential for a wider environmental net gain, to include wider natural capital benefits, such as flood protection, recreation and improved water and air quality. This aims to enable local planning authorities to target environmental enhancements that are needed most in their areas and give flexibility to developers in providing them.

As national policy continues to be developed, several industry organisations and businesses have already committed to delivering, researching, or developing tools to achieve, environmental net gain. Many such tools, definitions and initiatives expand on work involving **natural capital**, multifunctional benefits, or **ecosystem service measurement**.

A list of useful current tools and initiatives includes:

Tool or initiative:	Description:
The Environmental Benefits from Nature Tool - Beta Test Version	The Environmental Benefits from Nature tool is designed to work alongside Biodiversity metric 3.0 and provide developers, planners and other interested parties with a means of enabling wider benefits for people and nature from biodiversity net gain. The tool uses a habitat-based approach to provide a consistent means of considering the direct impact of land use change across 18 ecosystem service services. More information is available here.
The NATURE tool	This Excel tool assesses the benefits of natural capital (interventions) at the project scale. These are assessed across 17 ecosystem services including flood risk regulation, air quality regulation, carbon storage, recreation, and educational benefits. By systematically assessing the expected impact of projects on natural capital at an early planning/design stage, the tool helps to highlight the benefits of different options and designs; in particular, the impact of NBS. More information is available here.
Enabling a Natural Capital Approach (ENCA)	Enabling a Natural Capital Approach (ENCA) includes comprehensive information and resources for Natural Capital. It covers:

	▪ The natural capital framework. ▪ Economic valuation of the environment. ▪ How project or policy appraisal can incorporate natural capital ▪ Natural capital accounting principles and methods, benefits and challenges. ▪ Applying natural capital at a local level. ▪ An Excel worksheet template to assess the potential effects of a policy or project on natural capital. ▪ ENCA services databook with around 200 sources of selected biophysical and valuation evidence for ecosystem services. ▪ ENCA assets databook collates over 100 UK data sources, tools and studies for the 8 natural capital asset categories. ▪ ENCA featured tools includes summaries of tools developed or supported by Defra and its agencies. ENCA is recommended for use by HM Treasury's Green Book: appraisal and evaluation in central government (2020) and represents supplementary guidance to the Green Book. More information is available **here.**
Natural Capital Atlases	The Natural Capital Atlases provide an "off the shelf" natural capital evidence base for each county or city region. They map out Natural England's Natural Capital Indicators to show the quantity, quality and location of ecosystem assets, and the flow of ecosystem services. More information is available **here.**
Natural Capital Evidence Handbook: to support place-based planning and decision making (NERR092)	This guide sets out an approach to help include natural capital evidence in strategic decision making and identifies Natural England's relevant evidence-based tools. It also includes a Natural Capital and Ecosystem Approach Checklist. More information is available **here.**
Natural Capital Committee: natural capital workbook	This guide presents a specific method for improving the environment, based on a more general framework for investing in natural capital. It provides the means to: ▪ Measure the natural capital in a particular area and the benefits it can provide. ▪ Identify threats and opportunities to natural capital. ▪ Weigh up the available options and opportunities to make improvements. ▪ Develop practical plans. More information is available **here**.
Local Environment and Economic Development (LEED) Toolkit	The Local Environment and Economic Development (LEED) Toolkit is designed to help Local Enterprise Partnerships and local authorities meet their economic growth targets through explicitly considering the economy's relationship with the environment: to both maximise benefit and minimise risks. More information is available **here**.

UK natural capital accounts (ONS)	Estimates of the financial and societal value of natural resources in the UK. More information is available here.
Natural Environment Valuation Online (NEVO)	Natural Environment Valuation Online (NEVO) allows users to explore and visualise the impact of changes in natural capital management on flows of ecosystem services in England and Wales. NEVO combines a selection of economic and environmental models in a single platform with a map-based interface, combining grid based and site based aspects. The models include economic (agriculture, forestry, recreation) and environmental models (biodiversity, water quality and quantity, agricultural carbon, forestry carbon and woodland carbon code calculator). More information is available here.
Managing Ecosystem Services Evidence Review (Formally Ecosystem Services Transfer Toolkit NECR159)	A literature review of the effect of land management actions on the provision of ecosystem services. The tool can be searched and queried to find evidence of the effects of specific land management actions on ecosystem services provided by upland, freshwater, urban, lowland agriculture, coastal and marine habitats. More information is available here.
Environmental Valuation Reference Inventory (EVRI)	EVRI is an international searchable online database of empirical studies on the economic value of environmental benefits and human health effects, with options to filter searches. More information is available here.
Natural Capital Register and Account	The Environment Agency's Natural Capital Register and Account presents the value, quantity and quality of natural resources in a place. The tool is being trialled and further developed. The tool and supporting reports, guidance and training video can be accessed from the Environment Agency's Natural Capital team by emailing naturalcapital@environment-agency.gov.uk.
Ecosystem Knowledge Network's 'Tool Assessor'	The Ecosystem Knowledge Network's 'Tool Assessor' provides a detailed review of some of the leading models within the sphere of natural capital and land use. More information is available here.
EcoservR	EcoservR takes data from nationally available datasets such as Ordnance Survey (OS) MasterMap, OS Greenspace, Priority Habitat Inventory, CORINE Land Cover, Crop Map of England and more to create a detailed habitat map. From this habitat map and supporting data, EcoservR measures supply for seven ecosystem services, and demand for four. Unlike spreadsheet-based tools which return a single score, EcoservR uses spatial models which consider the extent of different habitats and also their configuration. It returns heat maps showing the distribution of supply and demand across the landscape. More information is available here.
HydroloGIS	HydroloGIS identifies, ranks and prioritises all potential solutions to water-related problems across urban and/or rural landscapes. HydroloGIS mathematically models interactions across entire

	landscape systems to identify 'best bang for buck' NBS. More information is available here.

Case Study: Greater Manchester's Natural Capital Accounts and Ecosystem Services Opportunity Maps

Greater Manchester's Natural Capital Accounts and Ecosystem Services Opportunity Maps were developed by the Natural Course Project. The associated methodology is replicable and can be used across different landscapes and varying scales. The project sets a precedent whereby stakeholders in Greater Manchester have a robust evidence base which can be viewed on the MappingGM website.

The **GM Natural Capital Accounts** measure the benefits provided by the city region's natural assets to its businesses, public services and residents. **GM's Ecosystem Services Opportunity Map** is an open-source map shows the range of opportunity for improving Ecosystem Services. Each land parcel has its own specific opportunities for improvement. Displayed in "heat-map" style, the hotter the colour, the greater the scope for improvement. The maps can help target investment in nature-based solutions and ecosystem resilience.

Further information on natural capital and ecosystem services is available here through the work of the **Natural Capital Committee.**

Afterword

UKGBC has developed additional relevant guidance and outputs to help support successful local authority nature, adaptation and green infrastructure policy making, and its delivery, as part of the wider UKGBC Resilience & Nature Programme. These documents should be read in conjunction with the Playbook to develop key topic areas further.

In addition, in order to expand on key areas of work identified during the drafting process, particularly in the context of national policy development, several future workstreams are planned to develop key areas in more detail.

Retrofit and national advocacy

UKGBC is stepping up its dedicated programme of work to drive progress on home retrofit at both a national advocacy and local authority level. This top-down and bottom-up approach to breaking the retrofit logjam builds on UKGBC's Accelerator Cities programme, and will champion holistic retrofit solutions, including adapting our homes to a changing climate and supporting nature restoration.

For more information, please contact policy@ukgbc.org.

BNG and ENG implementation guidance

With biodiversity net gain (BNG) becoming a mandatory requirement and environmental net gain (ENG) principles being increasingly adopted, this project aims to create a range of accessible resources for individuals wanting to increase their knowledge and understanding of the two approaches, including informative videos and short explainer documents, alongside Roundtable learning opportunities.

Climate resilience roadmap

The UK built environment sector currently lacks the definitions and targets needed to become climate resilient by 2050. This project aims to scope and propose an industry wide collaborative project to set new climate resilience and adaptation targets for the sector.

Nature-Based Solutions finance and innovation lab

Similar to the Physical Risks Labs project, this project aims to bring together industry experts and built environment actors to discuss and work through the barriers of implementing and financing NBS in urban environments. Through a series of workshop sessions, attendees will be able to share knowledge, build capacity and develop innovative solutions for developments and operational assets that wish to increase nature-based approaches.

For more information, please contact resilience.nature@ukgbc.org.

Appendices

Glossary

Biodiversity Action Plan (BAP): see page 6

Biodiversity Net Gain (BNG): BNG requirements aim to ensure that developments have a net positive impact on biodiversity overall, by minimising any negative impacts, restoring existing areas or via offsetting.1 To achieve 'net gain', the biodiversity value attributable to the development must exceed the pre-development value by 10%. [20]

Blue infrastructure (BI): Naturally occurring or created water bodies incorporated into urban design in conjunction with SuDS features. When in combination with green infrastructure referred to as blue-green infrastructure. [21]

Climate resilience: Climate resilience is referred to as the capacity to anticipate, prepare for and respond to hazardous events or trends related to climate. With regards to the built environment, it is the ability of buildings, landscapes, and infrastructures to adapt to – and reduce the impacts of – climate-related events, such as flooding or overheating.[22]

Ecosystem Services: The benefits that people derive from the natural environment and its processes. These benefits are anthropocentric and can be categorized as provisioning services (food, water, timber, fibre), regulating services (climate, floods, disease, wastes, water quality), cultural services (recreation, aesthetics, spirituality), and supporting services (soil formation, photosynthesis, nutrient cycling), which the health and sustenance of humankind is dependent upon. [23, 24]

Environmental Net Gain (ENG): The concept of ENG builds upon the Government's ambition to leave the environment in a 'better state' for the next generation [25]. To realise this vision, environmental improvements are to be ensured within all forms of development regarding both new and existing buildings and wider infrastructures. ENG therefore expands upon existing BNG principles to take into consideration the function of wider ecosystem services, such as flood protection, recreation and improved water and air quality. [26]

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[26] EIC (2019). Delivering environmental net gain: An EIC position paper. [online] Available at: https://eic-uk.co.uk/media/eebhjdb3/delivering-environmental-net-gain-2019.pdf

Green Infrastructure (GI): Our world's natural life-support system – an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks, and other conservation lands; working farms, ranches, and forest; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life for communities and people. [27]

Local Nature Recovery Strategies (LNRS): see page 21

Natural capital: Elements of nature that either directly or indirectly produce value and provide benefits to people, including ecosystems, species, freshwater, land, minerals, the air, oceans, and natural processes and functions. [28]

Nature-based solutions (NBS): Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. [29]

Sustainable Urban Drainage Systems (SuDS): Any system utilising natural resources in place of grey infrastructure for water drainage and management. [30]

Urban Greening Factor (UGF): see page 68

[27] Benedict, M. A. and McMahon, E. T. (2006). Green Infrastructure: Linking Landscapes and Communities. Island Press, Washington
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