UK GBC

Together for a better built environment

Principles for delivering urban Nature-based Solutions

APRIL 2021

Funding Partner

John Ellerman Foundation

REPORT SUPPORTERS:

The Prince's Responsible Business Network

ciria

Construction Innovation Hub

Green Finance Institute

Landscape Institute
Inspiring great places

the Land Trust

RHS
Inspiring everyone to grow

Citation:

Principles for delivering urban Nature-based Solutions. UK Green Building Council, 2021, London, UK.

Contents

Foreword

Eighteen months ago, UKGBC launched an ambition for the built environment industry that placed nature at the heart of the industry's response to climate risk and the ecological crisis. The aim is that by 2030, all buildings and infrastructure will be climate resilient and maximise environmental net gains, through the prioritisation of nature-based solutions (NBS). This report is intended to help the industry achieve this stretching ambition. Its creation over the last 12 months has coincided with a period of unprecedented change for our society that has resulted in an increased appreciation of nature and green spaces within our urban environments. Local communities are now asking for greener and more resilient buildings and cities, with these demands being echoed by city authorities, national governments, and the finance sector.

This report sets out six principles for delivering urban NBS in order to help developers, owners, operators, and occupiers to design, deliver, and operate their assets in such a way that improves climate resilience and environmental impact. The range of initiatives, policies, commitments, and tools highlighted within the guidance is testament to the rapid evolution in the topics of climate adaptation, restoring nature, and promoting biodiversity.

I believe the publication of this report marks the beginning of a new chapter for the built environment industry; one in which we connect more deeply with nature, appreciate its ability to solve some of our most pressing challenges, and learn how to weave it into the fabric of our urban environments. UKGBC will continue to work with our members on this journey, including through our new Resilience and NBS programme.

Finally, I would like to thank my colleagues who worked so hard to bring this report into existence and acknowledge the many individuals within the UKGBC membership who generously gave their time, knowledge, and insights to the creation of this industry guidance.

Alastair Mant
Director of Business Transformation,
UKGBC

Glossary

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%.[2]
Capital Expenditure (CAPEX)	The financial costs incurred at the outset of a project, for example, the investment associated with the initial implementation of Nature-based Solutions.[3]
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.[4]
Ecosystem services	The benefits that people derive from the natural environment and its processes. These benefits are anthropocentric and can be categorised 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.[5,6]
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.[7] 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.[8]
Environmental, Social and Governance (ESG)	Environmental, Social and Governance (ESG) issues refer to those that fall outside of traditional financial metrics, yet also pose an extensive (and increasing) risk to the security of an organisation's operations or investments. For example, biodiversity loss, climate injustice, and lack of formal political support are crucial ESG issues facing Nature-based Solutions implementation.[9] Broadly, ESG policies or practices are representative of corporate sustainability and organisational approaches to risk management.
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.[10]
Locally Determined Contributions (LDCs)	The commitments, pledges or action plans set at local authority level that aim to tackle climate change and assist the delivery of the UK's net zero carbon objectives by 2050. LDCs represent the respective bottom-up efforts of local authorities to meet or even exceed Government targets.[11]
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.[12]
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.[13]
Net zero carbon	Net zero refers to a state in which emissions released into the atmosphere are balanced by removal of emissions out of the atmosphere. Net zero carbon is achieved for buildings when the amount of carbon emissions associated with their construction or long-term operations are zero or negative.[14]
Operational Expenditure (OPEX)	The financial costs associated with the ongoing operations of a project, for example, the continued funding for management and maintenance practices that are necessitated by Nature-based Solutions.[15]

Executive Summary

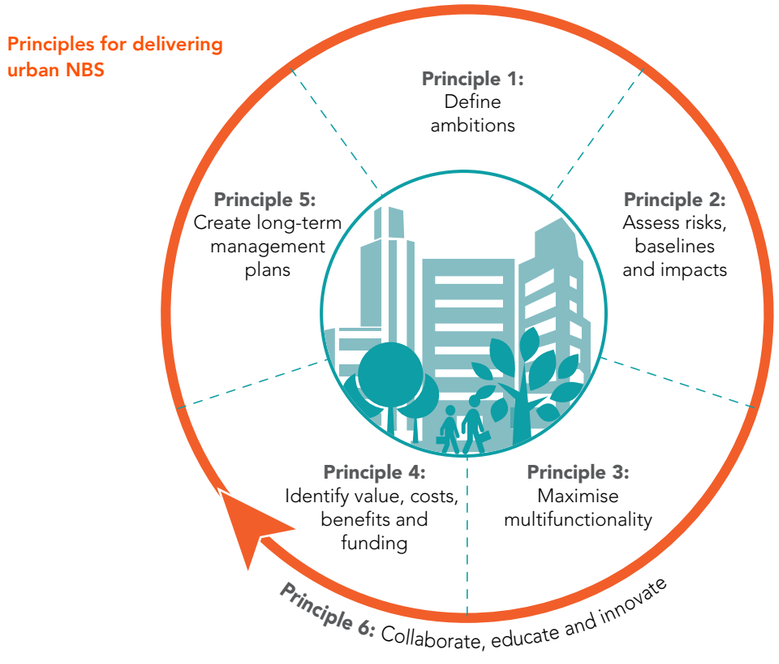
NATURE-BASED SOLUTIONS TO THE CLIMATE AND ECOLOGICAL CRISES

Nature provides services that can remove and store atmospheric carbon, adapt to climate change and enhance resilience, restore ecosystems, improve human health, generate social value, abate risk-related costs, reconnect people with nature and provide economic uplift. More effective and widespread incorporation of Nature-based Solutions (NBS) within building designs, developments, and operations presents an opportunity to adapt to changing policy requirements, improve the resilience of built assets, reduce carbon emissions, and create environmental net gain (ENG).

This report aims to enable more ambitious targets related to NBS, climate resilience and ENG, and ultimately increase the application of NBS, both wild and cultivated, in urban areas. To achieve this, the report sets out six principles to assist organisations and individuals in the design, delivery, and operation of urban NBS, along with the methods that can be used to achieve them, and case studies of real-world application. Ranging from strategic inception to considerations for short-term funding, long-term management and future research and innovation, these principles aim to provide an overview of methods that can be utilised to further drive the consideration of NBS both conceptually and practically within a range of urban development contexts.

The principles and supporting information are primarily intended to be used by developers, owners, operators, and occupiers of buildings and infrastructure within an urban context. Specifically, those organisations' decision makers, finance departments, marketing departments, design teams and sustainability professionals. The content will also be of value to engineers, architects, landscape architects, contractors, landscape contractors, planners, private house owners, professional bodies, national and local policy makers and environmental non-governmental organisations (NGOs).

Following the publication of this guidance, UKGBC will continue to work with industry stakeholders on the topics of climate resilience, ENG, and NBS. We will focus on collaborative activities that will provide the industry with the guidance and solutions to our shared challenges.



PRINCIPLES AND METHODS

PRINCIPLE 1: Define ambitions	1.1: Adopt UKGBC's NBS ambition
	1.2: Align with the UN Sustainable Development Goals
	1.3: Set targets for climate adaptation and environmental improvement
PRINCIPLE 2: Assess risks, baselines, and impacts	2.1: Assess and disclose climate-related risks
	2.2: Assess and disclose nature-related risks
	2.3: Measure the changes in biodiversity
	2.4: Assess the function of ecosystem services
	2.5: Enable a natural capital approach
	2.6: Assess the functionality of NBS
	2.7: Assess the quality of NBS
PRINCIPLE 3: Maximise multifunctionality	3.1: Understand the multiple benefits of NBS
	3.2: Create interconnected habitats
	3.3: Maximise appropriate habitat variety
	3.4: Create multifunctional NBS
	3.5: Make NBS accessible
PRINCIPLE 4: Identify value, costs, benefits, and funding	4.1: Incorporate NBS into CAPEX and OPEX at the outset
	4.2: Assess the value of ecosystem services and natural capital
	4.3: Assess the full value profile of developments
	4.4: Use evidence bases to enhance investor confidence
	4.5: Use innovative funding streams
	4.6: Unlock capital through green finance
	4.7: Use crowdfunding approaches to generate capital
	4.8: Utilise the new market for biodiversity net gain
PRINCIPLE 5: Create long-term management plans	5.1: Run maintenance volunteer schemes
	5.2: Use a long-term stewardship model for habitat management
	5.3: Monitor and evaluate NBS interventions
PRINCIPLE 6: Collaborate, educate, and innovate	6.1: Establish relationships with suitable partners
	6.2 Engage the local community
	6.3: Share resources and lessons learnt
	6.4: Utilise internal communications channels
	6.5: Use external training courses and workshops
	6.6: Engage with industry-wide research and innovation efforts

Introduction

"Global average temperatures have increased 1°C since the industrial revolution and current projections indicate a 4°C by 2100."
(Intergovernmental Panel on Climate Change, 2018)

THE CLIMATE-BIODIVERSITY CRISIS

The global climate is changing.
Since the industrial revolution, the cumulative impact of human actions has increased global average temperatures by over 1°C, and this is on course to reach 4°C by 2100. This threatens to usher-in a new geological epoch characterised by greater climate instability.[16] For the UK, this means hotter drier summers, which by 2040 are estimated to regularly reach 38.5°C and by 2050 could cause 7,000 heat related deaths a year.[17] The UK will also experience wetter winters, increasing the likelihood of major flood events that have cost the UK economy over £6billion in damages since 2000.[18,19,20]

These are events which, on the whole, the current built environment is not prepared to withstand. [21]

To limit global heating this century to below 1.5ºC, greenhouse gas (GHG) emissions must be halved by 2030, and to help achieve this the UK has a legally binding 2050 net-zero carbon target.[22,23] The built environment accounts for around 40% of emissions, and faster, more decisive, and holistic action is required across the industry if it is to play its commensurate part in the required carbon reductions. [24,25,26]

Global ecosystems are collapsing.
The degradation of the natural world over the last 50 years has been unprecedented.[27,28] Now biodiversity loss (wild and cultivated) and ecosystem failure constitute a critical threat to societies across the globe.[29] The built environment has a significant impact, as habitats and landscapes are degraded in the extraction of materials for the construction industry, and further habitats are compromised or lost through continuing urban development. As urban areas sprawl, developments encroach on pre-existing natural environments, driving wild species away and pushing remaining habitats and nature further from our communities. Within cities, the perpetual demand for development threatens the remaining resilience and ecological cohesion of urban greenspaces, disconnecting already fragile habitat networks and disrupting local ecosystems. The COVID-19 pandemic has shone a spotlight on the societal disparity in access to greenspaces across the UK and re-emphasised people's basic requirement to be connected to nature for exercise, leisure, relaxation and to improve mental, physical, and social health and wellbeing.[30]

Crucially, climate change and nature loss are deeply interrelated and present enormous risks to both communities and businesses.[31] Many Local Planning Authorities (LPAs) across the UK have recognised these risks, with over 75% declaring a state of Climate Emergency.[32] However, abating the significant risks posed to global insurance, investment, and debt markets calls for a much broader review of the way in which we consider nature within our strategic decision-making and physical operations.[33]

Solutions exist.
UKGBC has a vision for a built environment that enables people and planet to thrive. This includes by "mitigating and adapting to climate change" and "embracing and restoring nature and promoting biodiversity". You can see our full vision here. In 2019, we worked with industry to set a time bound and measurable ambition statement that is commensurate with the scale of the challenges regarding adapting to climate change and restoring nature.

"By 2030, all buildings and infrastructure will, throughout their lifetime, be climate resilient and maximise environmental net gains, through the prioritisation of nature-based solutions."[34]

Nature (both wild and cultivated) provides services that can remove and store atmospheric carbon, adapt to climate change and enhance resilience, restore ecosystems, improve human health, generate social value, abate risk-related costs, reconnect people with nature and provide economic uplift.[35,36] More effective and widespread incorporation of NBS within building designs, developments, and operations therefore presents an opportunity to adapt to changing policy requirements, improve the resilience of built assets, reduce carbon emissions and create environmental net gain (ENG).[37] The realisation of this potential requires local government, built asset developers, owners, occupiers, and operators to incorporate NBS into their policies and practices for both new developments and existing assets.

For our response to the challenge of mitigating climate change, see our Advancing Net Zero programme and the Net Zero Buildings Commitment.

The greater the adoption and implementation of NBS across our town and cities, the greater the proportionate benefits they can provide

"Biodiversity loss and ecosystem collapse are one of the top five threats facing humanity in the next decade."
(World Economic Forum, 2020)

"Global urban land mass has doubled since the Rio Summit 1992."
(IPBES, 2019)

"UK species abundance has decreased by 41% since 1970."
(State of Nature Partnership, 2019)

"Global wildlife populations have decreased by 68% since 1970."
(WWF, 2020)

"5.2 million buildings are currently at risk of flooding in the UK."
(Environment Agency, 2019)

THE BENEFITS OF URBAN NBS

This research was undertaken by the IGNITION project and this graphic has been amended from the IGNITION project's Nature-based solutions to the climate emergency: The benefits to business and society report.

Headline findings

The following illustrations provide a summary and comparison of the headline findings* for each of the NBS researched.

* Average cost data taken from IGNITION project cost collation database, containing technical reports and supplier information

Sustainable drainage system (SuDS)

The management of surface water runoff within the urban environment to mimic the natural drainage processes, while supporting broader biodiversity and amenity aims

60–72%
Rainwater runoff retained

60–80%
Similarity in species richness to a natural pond

79%
Total suspended solids removed in filter strip/swale SuDS system

Average CAPEX installation cost (£ per m²)

£30 Detention ponds/basin
£26 Retention ponds/basin
£366 Soakaway
£23 Swale
£336 Raingarden

Average OPEX maintenance cost (£ per m²yr)

£0.33 Detention ponds/basin
£1.10 Retention ponds/basin
£0.12 Soakaway
£0.10 Swale

Common alternative terms: Drainage systems, natural drainage systems, Water Sensitive Urban Design (WSuDS)

Street trees

Trees located next to or within a public road

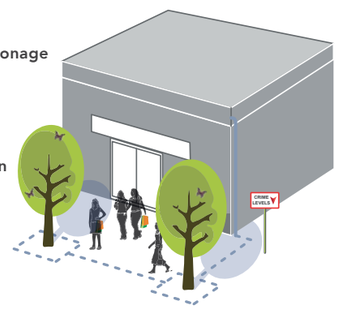
30–50%
Increased restaurant patronage

3˚C
Air temperature reduction

5.5kg
Carbon sequestered per tree annually

SuDS-enabled street trees

Street trees combined with a sustainable drainage system



Average CAPEX installation cost (£ per m²)

£248 per tree
£7,477 SuDS-enabled street trees

Average OPEX maintenance cost (£ per m²yr)

£0.12 per tree

Green roof

Vegetation growing on any structure's horizontal surface

6.7%
Total energy savings for the space directly below the green roof

6.9%
Uplift to property value by an accessible green roof

11db
Noise reduction by an extensive green roof

Average CAPEX installation cost (£ per m²)

£126 Extensive green roof
£176 Intensive green roof

Average OPEX maintenance cost (£ per m²yr)

£6 Extensive green roof
£11 Intensive green roof

Common alternative terms: Living Roof, eco-roof, roof garden, brown roofs, green-blue roofs, biodiverse roofs

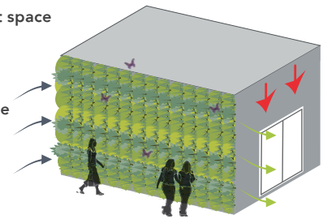
Green wall

Vegetation growing on or against a vertical surface

8%
Total energy saving for adjacent space

2.7˚C
Reduction in indoor temperature from green façade

18–35%
NO2 removed in street canyons



Average CAPEX installation cost (£ per m²)

£282 Green façade
£702 Living wall

Average OPEX maintenance cost (£ per m²yr)

£38 Living wall

Common alternative terms: Green facades, bio-responsive/bio reactor façade, living walls, vertical greening system, green screen, hedges

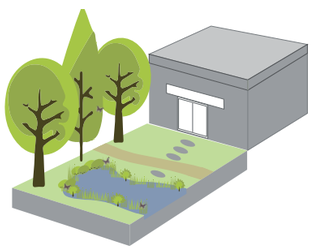
Urban parks and green space

Areas that are naturally or artificially covered with vegetation (e.g. grass, bushes or trees). Can range from playing fields and highly maintained environments to relatively natural landscapes

10%
Increase in willingness to pay for products associated with green cover

9.5%
Increase in property value in direct or close proximity to a park

84.2%
Rainwater runoff retention



Average OPEX maintenance cost (£ per m²yr)

£0.71
Urban parks and green space

Common alternative terms: Urban parks, urban green cover, amenity grassland and sports pitches

PURPOSE OF THIS REPORT

The aim is to enable more ambitious targets related to NBS, climate resilience and ENG, and ultimately an increase in the application of NBS, both wild and cultivated, in urban areas. To achieve this, the report sets out six principles to assist organisations and individuals in the design, delivery, and operation of urban NBS, along with the methods that can be used to achieve them, and case studies of real-world application. Ranging from strategic inception to considerations for short-term funding, long-term management and future research and innovation, these principles aim to provide an overview of methods that can be utilised to further drive the consideration of NBS both conceptually and practically within a range of urban development contexts.

TARGET AUDIENCE

The principles and supporting information are primarily intended to be used by developers, owners, operators, and occupiers of buildings and infrastructure within an urban context. Specifically, those organisations' decision makers, finance departments, marketing departments, design teams and sustainability professionals. The content will also be of value to engineers, architects, landscape architects, contractors, landscape contractors, planners, private house owners, professional bodies, national and local policy makers and environmental non-governmental organisations (NGOs).

METHODOLOGY

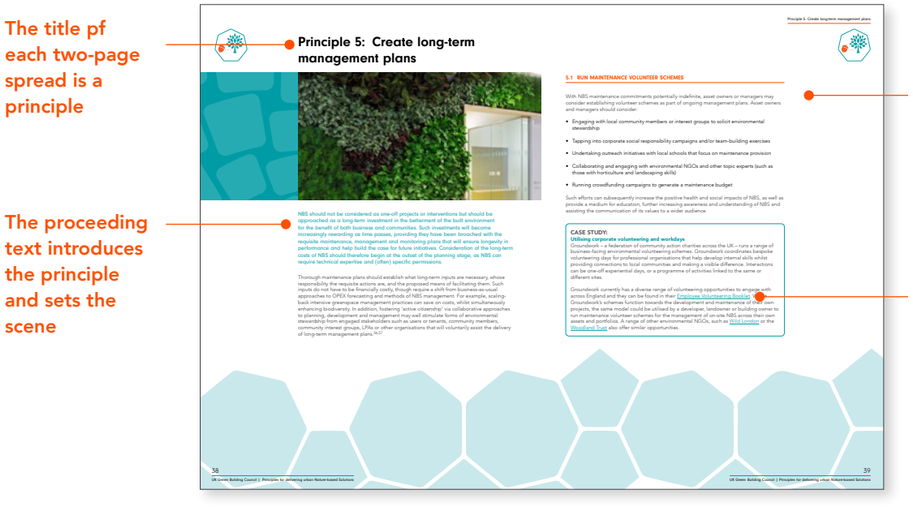
The strategic direction for this guide was provided by a Steering Group of 15 topic experts from business, environmental NGOs, academia, and government agencies. The role of the Steering Group was to help create and launch these principles by advising on the scope and content, providing relevant research, and connecting UKGBC with further experts.

Extensive primary and secondary research were undertaken by UKGBC, starting with a review of grey literature through desktop research to develop an in-depth understanding of the latest thinking. Secondly, through two workshops with over 40 industry professionals, the foundation of the principles was built on a virtual platform. To articulate a narrative, real-world experience and knowledge were captured through interviews with 30 industry professionals. Their subject expertise covered: biodiversity, natural capital, and climate resilience. Case studies were gathered via these interactions and also through email communications with a much larger number of UKGBC members.

Finally, working with the programme Steering Group, a Peer Review group, and a 'Supporters' group, the principles, methods and case studies were refined and revised into their final form. The full list of contributing individuals and organisations can be found in the 'Acknowledgements' section within the Appendices.

UTILISING THE PRINCIPLES

This report sets out six principles to assist organisations and individuals in the design, delivery and operation of urban NBS, along with the methods that can be used to achieve them, and case studies of real-world application. The diagram below provides an overview of how we have structured each section:



The principles and methods are not intended to be considered in an explicitly linear fashion, but to aid the reader we have done so to the extent that is possible. The principles and methods can be considered in combination with one another or independently. The rationale is to facilitate a flexibility in usage that accounts for the diversity of the principles' intended audience, appreciating that organisations are at different stages in their transition to a more sustainable built environment.

The guiding principles and supporting methodologies and case studies have been identified by a range of experts as capable of enhancing the understanding, consideration, function and value of NBS within the built environment both strategically and in project-specific contexts. The methodologies and case studies provided do not intend to comprise an exhaustive nor definitive list and it remains the responsibility of the reader to determine which approach is the most suitable for their particular circumstance. However, they do constitute a collection of approaches and examples that are considered to help enable the use of NBS at various development and operational stages, whilst being broadly accessible and transferrable in practice.

The resources and processes signposted here are developing and evolving rapidly in response to a greater understanding of the potential of NBS. As such, it is intended that this collection is a first iteration. It will need to be updated as industry tools and the policy landscape continue to respond to the climate and ecological crises.

Principle 1: Define Ambitions

Defining and adopting ambitions for climate resilience and the environment can shape the trajectory of a project and influence the direction of an organisation's operations more broadly. Ambitions should be representative of the desired function of an organisation or the intended outcomes of a project and should always consider the perspectives of engaged or impacted stakeholders, particularly when retrofitting.

Desired outcomes can be defined ahead of, or following, an assessment of relevant climate and ecosystem-related baselines and risks, depending on the intended function of such ambitions. Establishing outcomes prior to risk assessment may leave an organisation or project vulnerable to risks they have not identified for necessary adaptation or mitigation. Conversely, establishing baselines prior to setting out what the desired sustainability outcomes are or will be, may limit their ambition or scope.

Either way, defining ambitions for climate resilience and environmental impact recognises the role and responsibility of organisations to contribute towards their achievement. With defined ambitions, industry stakeholders will need to hold themselves and others accountable for their delivery, therefore advancing their attainment. Adopting strategic or project ambitions should therefore be encouraged to enhance the climate adaptation and ecological prosperity of our built environments.

1.1 ADOPT UKGBC'S NBS AMBITION

In response to the climate and ecological crises, UKGBC worked with industry in 2019 to set a time-bound and measurable ambition that the industry could aim for in relation to climate resilience and environmental impact. This resulted in the following ambition statement, which built environment businesses are encouraged to adopt and then identify the actions they can take to achieve it:

"By 2030, all buildings and infrastructure will, throughout their lifetime, be climate resilient and maximise environmental net gains, through the prioritisation of nature-based solutions."

1.2 ALIGN WITH THE UN SUSTAINABLE DEVELOPMENT GOALS

The UN Sustainable Development Goals (SDGs) are a set of targets that strive to overcome global climate, ecosystem and societal challenges. They represent a universal call to end poverty, protect the planet and improve the lives of everyone. The SDGs are most effective when used holistically as an educational and collaborative tool. An awareness of all 17 goals and their inter-relationships aids collaborative working and helps to avoid any detrimental actions that may adversely affect one key priority over another.

Crucially, NBS can make an important contribution to the delivery of the SDGs: they support vital biodiversity and ecosystem services, including access to fresh water, improved livelihoods, healthy diets and food security from sustainable food systems. Targets that account for NBS value harmony between people and nature, as well as ecological development and represent a holistic, people-centred response to climate change. They are effective, long-term, cost-efficient and globally scalable.

CASE STUDY:
Setting strategy using the UN SDGs and UKGBC's NBS ambition

Willmott Dixon – a contractor and interior fit-out group – have launched their 'Now or Never' strategy that sets a range of timebound ambitions to design and deliver buildings that are future climate ready, that are net-zero operational carbon, optimise user health and wellbeing, and deliver ENG.

Willmott Dixon have utilised the UN SDGs and UKGBC's NBS ambition as a framework to align the aims of their Now or Never strategy to, which prioritise the inclusion of NBS within all projects to maximise ENG. This includes a pledge to plant 100,000 trees to support meeting these objectives in practice by 2030.

1.3 SET TARGETS FOR CLIMATE ADAPTATION AND ENVIRONMENTAL IMPROVEMENT

It is important to set targets that mitigate climate and ecological risks, whilst simultaneously driving economic, social, health and environmental improvements. A comprehensive understanding of the most effective means of intervening against climate change and ecosystem degradation within the context of a given project is therefore essential. The Government's National Adaptation Programme provides such guidance, outlining how to appropriately adapt to a range of climate and environment-related risks across the UK.[38]

In addition, organisations can set goals towards achieving nature-positive operations by using the Science-Based Targets for Nature (SBTN) approach. The SBTN approach can assist businesses to set measurable, actionable and time-bound objectives that are grounded in scientific evidence and which respect ecological thresholds and deliver sustainability goals.

The five-step process for setting Science-Based Targets is:

1. **Assess** – Gather and/or supplement existing data to estimate impacts on nature and identify issues and potential target areas
2. **Interpret and prioritise** – Build on Step 1; prioritising key issues and locations for taking action within and between operations
3. **Measure, set and disclose** – Collect baseline data for prioritised targets, aligning them with ecological limits and societal ambitions and officially setting them and disclosing publicly
4. **Act** – Develop or incorporate an action plan/strategy and address contributions towards the use of/impact on nature
5. **Track** – Monitor progress and continue to report publicly

Principle 2: Assess risks, baselines, and impacts

NBS can be used to effectively reduce some of the physical and financial risks associated with climate change and ecosystem degradation, particularly within urban areas. In order to maximise their efficacy, it is integral that risks are understood, baselines are measured, and impacts are carefully monitored. A comprehensive understanding of risks and the means of managing them more effectively can reassure financial stakeholders, increase investor confidence, generate higher asset valuations and enable access to preferential insurance premiums. Failure to effectively consider risk, or ensure the continued protection and enhancement of nature, will result in considerably greater costs in the future.[39]

Here we signpost a range of potential tools and methods that can be used to assess climate and ecosystem-related risks, and the environmental impacts or benefits associated with an organisation's strategic operations or the outcomes of an individual project. The applicability of the approaches is dependent upon the defined ambitions of the organisation undertaking them, the needs of the project or the stakeholders involved, the scale of the project itself, or all of the above, and should therefore be evaluated on a case-by-case basis.

2.1 ASSESS AND DISCLOSE CLIMATE-RELATED RISKS

The UK government has announced its intention to make disclosures aligned with the Taskforce on Climate related Financial Disclosures (TCFD) mandatory across the economy by 2025, with a significant portion of mandatory requirements in place by 2023.[40] The TCFD framework outlines methodological approaches for measuring and disclosing the transitional and physical risks from climate change to investors, lenders, insurers and other key financial stakeholders.[41]

The physical and transitional risks from climate change to financial stakeholders include:

- Macroeconomic shocks or financial losses caused by extreme weather events or changes in weather patterns
- Unanticipated financial losses resulting from climatic impact on the global financial system
- Risks associated with changes in policy and client preferences
- Economic impacts resulting from greater precautionary saving and rapid pricing adjustments

There are currently several proprietary analysis tools that can provide organisations with scenario-driven assessments of climate change risks for physical assets. These include:

- Planetrics climate risk model
- MSCI's Climate Value-at-Risk assessment

The UK Climate Projections (UKCP) also contain information necessary to support the assessments required by the TCFD. The UKCP provides a toolkit to support adaptation decision-making across industry and governments. The UKCP provides an authoritative assessment of how the UK's climate is predicted to change through the 21st Century and the physical impacts of this. For NBS this includes:

- Understanding the changing frequency of heatwaves, extreme rainfall, and coastal extremes associated with sea-level rise to inform the business cases for investment in NBS
- Analysing changes to seasons in terms of temperature and rainfall distribution patterns that could inform choice of plant species
- Informing the design specification for various NBS solutions to ensure that a solution remains resilient throughout its expected lifespan

Further government guidance is also available regarding climate change impacts, potential adaptation measures and other means of effectively measuring and managing context-specific risks. Find out more here.

2.2 ASSESS AND DISCLOSE NATURE-RELATED RISKS

The Task Force for Nature-related Financial Disclosures (TNFD) is launching in 2021 with the overall goal of providing a framework for corporates and financial institutions to assess, manage and report on their dependencies and impacts on nature. This should help organisations assess nature-related risk and enable the redirection of global financial flows away from nature-negative outcomes and towards nature-positive outcomes. We await to see if the TNFD will garner the same level of support that the TCFD has from the finance industry and government.

2.3 MEASURE THE CHANGES IN BIODIVERSITY

A range of ecological surveys, impact assessments or appraisals can be utilised to measure the changes in biodiversity – both wild and cultivated – across a development lifecycle. The implications for species, cultivars and habitats throughout developments, either positive or negative, can be monitored providing they are measured prior-to design and following completion. Such insights will show how the presence of different animal, plant, and fungi species and landscapes may have changed as a result of the habitats and features created. Good practice shows that for most key groups of species and cultivars a survey should be taken every 2-5 years to effectively monitor and mitigate impacts. Current standard practice indicates that ecological surveys are largely utilised to assess, avoid, mitigate or compensate for the impacts of development, as opposed to explicitly measuring them.

Not all the changes incurred within a given development are measurable, and biodiversity can be influenced by other factors. Ecological and landscape surveys therefore need to be incorporated holistically as a tool to inform design and maintenance throughout the development lifecycle.

The "Guide to Ecological Surveys and Their Purpose" by CIEEM provides a snapshot of available approaches, while there is more comprehensive information in the CIEEM "Guidelines for Ecological Impact Assessment" (EcIA). An EcIA may form the ecological component of an Environmental Impact Assessment (EIA), which since 2017 have been utilised to evaluate the environmental impact of planning permissions, where deemed necessary. Friends of the Earth provide useful guidance covering the 'what', 'when', and 'why' of EIAs.

The Department for Environment, Food and Rural Affairs' (DEFRA) Biodiversity Metric offers an additional means of measuring change in habitats on-site, which can then be used as a proxy for the overall impact on biodiversity. Calculations from the Biodiversity Metric can be used to indicate the losses and gains to habitats that come from development or land management change, though again, expert ecological inputs are required to ensure these are accurate.

DEFRA are also creating a Small Sites Biodiversity Metric, which is a simplified version, better suited for small developments, likely to be categorised as 10 housing units or less, or up to 5,000 m^2 or less. The Small Sites Biodiversity Metric and updated Biodiversity Metric 3.0 are due in 2021, and some LPAs and developers have already started adopting BNG within plans and approaches. However, mandatory enforcement of BNG is unlikely until 2023.

CASE STUDY:
Assessing the environmental impact of a strategic urban extension
Bidwells advised on the strategic allocation of 217 hectares of land for a 4000-home urban extension within the Breckland Development Plan. An EIA was utilised to support and refine the planning application, ensuring the inclusion of a linear park, extensive green corridors, wetlands and open greenspaces. In this instance, an EIA effectively turned perceived design constraints into positive outcomes, advancing the planning application whilst ensuring appropriate outcomes for nature. Find out more here.

2.4 ASSESS THE FUNCTION OF ECOSYSTEM SERVICES

The Ecosystems Knowledge Network's (EKN) Tool Assessor provides information to help stakeholders identify available and appropriate tools for assessing the function of ecosystem services. The Tool Assessor then provides guidance regarding their application in practice. When measuring the function of ecosystem services, practitioners could utilise:

- Artificial Intelligence for Ecosystem Services (ARIES)
- EcoServ-GIS
- i-Tree Eco
- Spatial Evidence for Natural Capital Evaluation (SENCE)
- Greenkeeper

Eco-Metric is an emerging tool which will measure the ability of habitats to deliver ecosystem services and measure the overall change in natural capital and ecosystem services across a development's lifecycle. The tool is designed to work alongside the DEFRA Biodiversity Metric and will provide 'before' and 'after' habitat scores for respective ecosystem services following land use change. Such measurements can then feed into the overall valuation of NBS (see Principle 4).

CASE STUDY:
Assessing the ecosystem service provision of urban trees
In 2015, an i-Tree Eco assessment of London's urban forest estimated the function of the ecosystem services that the city's approximate 8.4 million trees provide. The report calculated that they store 2.4 million tonnes of carbon, sequester 77,000 tonnes of carbon annually, remove 2,241 tonnes of pollution annually, alleviate 3.5 million metres^3 of surface water runoff per year, and provide energy savings to buildings valued at £260,000 per year. The full report – Valuing London's Urban Forest – also estimated the wider economic value of these services. The i-Tree Eco tool contributes towards establishing a baseline of information that can be utilised to inform the long-term integrated and planned management of urban and community forests.

2.5 ENABLE A NATURAL CAPITAL APPROACH

At present, there are a number of natural capital tools available to policymakers and practitioners alike, though each has its own strengths and limitations. Utilising the guidance below can help to inform decision-makers in their choice of tools or methodologies, though these will need to be determined via consideration of the business context, resources, and needs.

Enabling a Natural Capital Approach (ENCA) guidance from the UK Government includes data, guidance and tools to help understand natural capital and how to take it into account on projects, including measuring the benefits. It supports and develops the HM Treasury Green Book Principles.

The Natural Capital Protocol (NCP) has been designed to help business managers make decisions that consistently consider natural capital across their operations. The NCP offers a standardized framework to identify, measure, and value the impacts and dependencies on natural capital to a business operating in any sector, in any geography, at any organisational level.

CASE STUDY:
Assessing the natural capital impact of Birmingham's Sustainable Urban Extension
In 2019, Birmingham City Council (BCC) utilised the Natural Capital Planning Tool (NCPT) on a masterplan for 6,000 new homes. The proposed site in Langley required the release of Green Belt land, a point of contention within local planning. The NCPT was utilised to assess the capacity of the development to deliver natural capital net gain over a 25-year period (in line with Government policy). The NCPT calculated the overall development impact score and provided information about design-strategies and best practice to improve the impact on ecosystem services. The process shifted both the local planners and the applicants view of the GI potential for the site, which was reflected in this Supplementary Planning Document (SPD) from 2019.

2.6 ASSESS THE FUNCTIONALITY OF NBS

The Urban Greening Factor (UGF), as outlined in the London Plan 2021, is a planning policy tool deployed by the Greater London Authority (GLA) to drive implementation of NBS in an urban setting. The UGF is a metric adapted from the Green Space Factor (GSF), which has been used in cities such as Malmö, Berlin, and Seattle. The UGF requires new developments to include a range of urban greening measures in order to achieve a UGF score to ensure all new development maximise the benefits of NBS. It is not prescriptive about the type of NBS that should be included; it measures the 'ecologically effective' area of the urban greening proposed for a project, for example, the area of greening which contributes to storm water drainage or supports biodiversity. This can be used to understand and compare, in simple terms, the functionality of a development based on the NBS used.

CASE STUDY:
Application of the Urban Greening Factor
Architects Sheppard Robson have utilised the UGF when integrating NBS into the design of Citicape House, London. This mixed-use proposal features a 3,700m^2 green wall that surrounds the entire building and a green roof. The design concept scored 1.37 using the UGF, therefore far exceeds the target outlined in the new London Plan.

Many developers are struggling to meet the target scores set by the UGF (0.4 for residential buildings, 0.3 for commercial). Also, the commercial and spatial context of the building itself (a high-end hotel located in the City of London) makes this example, at present, atypical. The UGF policy does require developers to go well beyond current standard practice, which is proving difficult. However, such action is essential if the climate ambitions of the City of London Borough (net zero or carbon neutral by 2025) and the locally determined contributions (LDCs) of other London Boroughs and LPAs across the UK are to be met.

Citicape House is a useful exploratory exercise; however, there is currently a disconnect between green ambition and recently updated building regulations regarding green walls. The industry needs to continue to consult on this, like it does with timber construction, to unlock the potential of vertical greening, whilst ensuring safety.


Citicape House © Sheppard Robson

2.7 ASSESS THE QUALITY OF NBS

The 'quality' of NBS depends upon the nature of the project itself and the intended function of the NBS in question. In one instance, the quality of the NBS may be measured according to its biodiversity provision or enhancement. In another, it may be weighed against its capacity for local economic uplift or contribution to the operational efficiencies of buildings and infrastructure. In addition, correct species selection and placement is integral for ensuring the benefits of NBS are optimised with minimal resource use.[42]

The Building with Nature standards and accreditation and the Wildlife Trusts' Biodiversity Benchmark facilitate context-specific appraisals of NBS quality within a given project.

Building with Nature enables developers to go beyond legal compliance and supports the creation of multifunctional NBS. This multifunctionality is measured according to: Climate resilience, wellbeing, water, and wildlife. The standard and accreditation can be used to assess the success of a proposed or delivered development in meeting these multifunctional outcomes and the retention of this value in perpetuity. The Building with Nature standards are flexible enough to be considered and applied to developments of varying scales, as well as at multiple stages of the development process, from planning to post-construction and long-term maintenance.[43]

The Wildlife Trusts' Biodiversity Benchmark can be used by landowners to manage the continual improvement of biodiversity enhancement and protection. This benchmark works complementary to the ISO14001 standards and is currently supported by a diverse range of organisations.

CASE STUDY:
Ensuring high quality design standards of NBS

The Meadowbank regeneration masterplan aims to improve health and wellbeing, protect mature tree stock, reduce carbon, and deliver around 600 high-quality, energy efficient homes. The brownfield regeneration project located in Edinburgh adopts a 'people-first' approach, establishing a 'sounding board' comprised of residents, councillors and LPA officers, consulting extensively and co-creating a vision for the urban environment that prioritises people and nature. The masterplan achieved the Building with Nature accreditation for its consideration of both new and existing green infrastructure across the site. Hedgerows provide linear habitat corridors with pollinator-friendly planting to support invertebrate populations. Planting will ensure ecological and structural diversity, employing the principles encouraged by Natural England's 'Mosaic Approach', whilst simultaneously managing surface water run-off across the site. The nature-sensitive design reflects local priorities and demonstrates the integral role of collaboration and community engagement when ensuring quality and longevity in design. Find out more here.

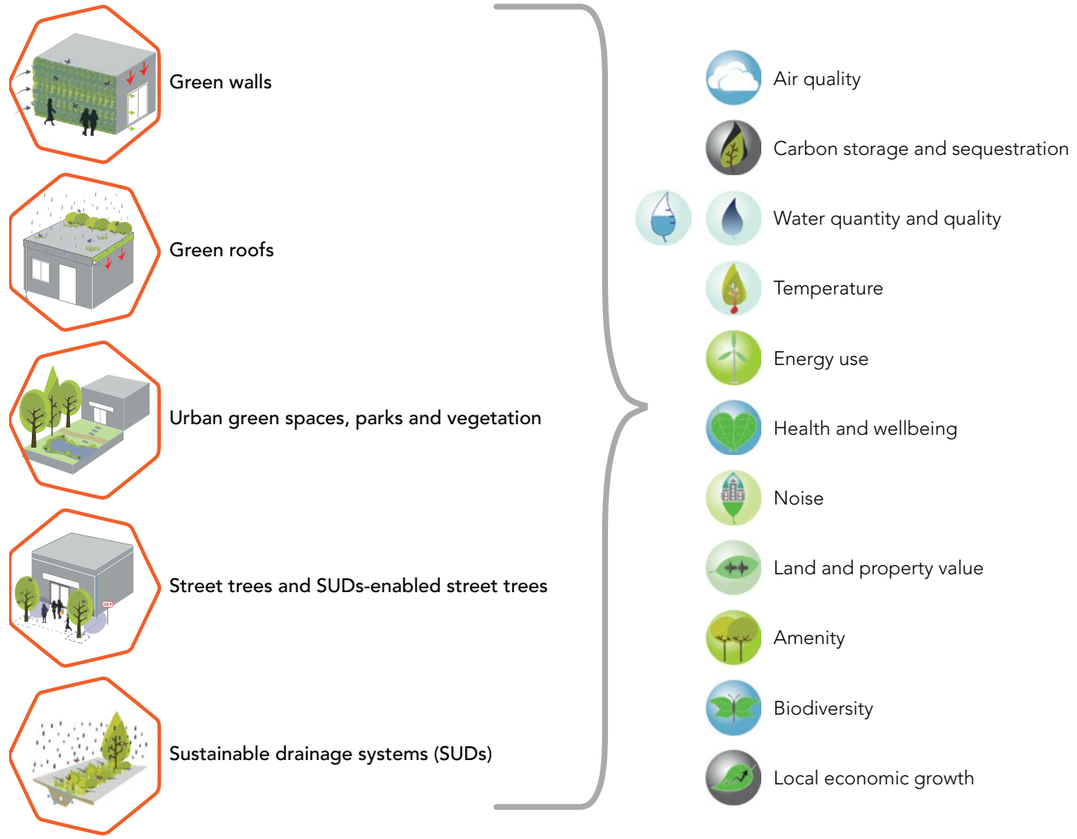
© Building with Nature

Principle 3: Maximise multifunctionality

NBS are most effective when they are deployed with consideration of their local environmental, social and ecological context and recognise their role within a broader network of green infrastructure.[44] When developed in such a way, the biodiversity uplift of NBS can provide a wide variety of services, including climate adaptation and mitigation, air and water quality improvements, community amenity space provision, psychological and physical and social wellbeing benefits, noise pollution abatement, flood risk mitigation or local economic stimulation and crime reduction.[45, 46]

Understanding the full range of benefits that NBS can provide, by appreciating the multiple types of NBS available and their respective functionality within a given context, is therefore essential if their benefits are to be maximised. Pre-design, this helps determine the right NBS for the project in accordance with the intended project outcomes. Post-completion, such valuations add to the expanding evidence base for NBS within urban areas, further bolstering the case for their continued or enhanced consideration within development practices. As the evidence base continues to grow, the position of NBS against traditional (grey infrastructural) approaches will be reinforced, consolidating it as a feasible and valuable alternative.

The primary benefits of NBS identified by the IGNITION project



3.1 UNDERSTAND THE MULTIPLE BENEFITS OF NBS

The IGNITION project Evidence Database collated scientific evidence that supports the economic, social and environmental benefits of different NBS. It includes datasets for green walls, green roofs, SuDS, green spaces, street trees and SuDS-enabled street trees. The findings can be utilised to value the benefits of various types of NBS and identify those best suited to meet the desired project outcomes.

3.2 CREATE INTERCONNECTED HABITATS

The Wildlife Trust's Nature Recovery Network aims to connect isolated habitats. In the urban environment this can be achieved by increasing the instances of urban green space and the linkages between them. Related guidance on best to design and build for the interconnectivity of both existing and future habitats is provided within their Towards A Wilder Britain report.

Through the Local Nature Recovery Strategies (LRNS), the UK government is piloting work on this concept and mapping the areas where nature can be restored. A mandatory requirement of the Environment Bill is for LPAs (as 'responsible authorities') in England to prepare and publish LNRS for their administrative areas. Collectively, the LNRS form the foundation for Nature Recovery Networks. The widespread incorporation of wildlife friendly designs within the built environment can help deliver Nature Recovery Networks. NBS can act as stepping-stone habitats for flora and fauna as green roofs or walls, as well as forming whole habitat corridors as a network of SuDS-enabled street trees. The more that such NBS are sensitively planned for and delivered, the more joined-up habitats become and the more ecologically viable and biodiverse our communities are.

CASE STUDY:
Connecting pollinator habitats
The B-Lines project coordinated by Buglife is a UK-scale initiative aimed at providing essential stepping-stone habitats and 'insect pathways' for our pollinators. The project aims to create or restore 150,000 hectares of flower-rich habitat across the UK, for the benefit of insect populations, wider flora and fauna, as well as communities. The B-Lines will protect pollinators, enhance pollination, enhance biodiversity, and connect people with nature. The B-Lines map is open access and the submission of any information regarding wildflower-rich planting is encouraged to further connect the dots between regions across the UK. Buglife provide a range of guidance on how best to contribute to this network of biodiverse action.

3.3 MAXIMISE APPROPRIATE HABITAT VARIETY

Sustaining stable and diverse populations of species within urban environments may require the creation of novel habitats for target species. These should ideally complement and reflect the ecological character of the area.

A 'Mosaic Approach' is recommended by Natural England, when managing habitats for species. This approach appreciates that diversity in species requires diversity in habitat, constitutive of a range of elements within one site, such as small patches of bare ground, tall flower-rich vegetation, or scattered trees and scrub. Such multifunctionality is frequently absent from our landscapes, though is deliverable through the effective consideration of NBS.

The Connecting Nature Framework Guidebook (Chapter 3) provides valuable information regarding how to deliver and maintain multi-functional NBS that are suited to the local ecological context.

The UK Biodiversity Indicators 2020 provide a comprehensive overview of the state of the UK's biodiversity, the value of the UK's natural assets, the challenges facing biodiversity in the UK, and general habitat and species information.

CASE STUDY:
Delivering biodiversity net gain in practice
Cator Park at Kidbrooke Village is set in 55 hectares of green and open space, comprised of grassland, meadows and wetlands that are rich in plants and wildlife. In partnership with the Royal Borough of Greenwich, Berkeley Group worked with the London Wildlife Trust and HTA Design to increase biodiversity and encourage birds, mammals and insects to nest amongst the ponds, wetlands, trees and wildflowers on the site. The collaborative efforts utilised NBS principles to introduce a rich mosaic of habitats and vegetation types to increase the ecological value and achieve Berkeley Homes' commitment to BNG. Upon completion, Kidbrooke Village will have achieved a net biodiversity gain of over 200%. Cator Park itself is the first of Berkeley Group's 40 BNG projects to reach maturity. Together these projects are set to create 194 hectares of new or improved natural habitats.


Cator Park, Kidbrooke © Nick Harrison

3.4 CREATE MULTIFUNCTIONAL NBS

IGNTION's Nature Based Solutions to the Climate Emergency Report outlines the benefits of a range of NBS to both business and society, highlighting how ensuring multifunctionality in design can deliver cost effective environmental, social and economic benefits simultaneously.

The Urban Greening for Biodiversity Net Gain design guide published by the Greater London Authority in partnership with the London Wildlife Trust provides guidance on how to design multifunctional urban landscapes that ensure benefits for wildlife. The guide provides design considerations for multiple urban greening features that each present an opportunity to make space for nature across the public realm, within Sites of Importance for Nature Conservation (SINCs), through the use of SuDS, and via designing-in green infrastructure on roofs, podiums, and facades.

CIRIA's SuDS Manual provides comprehensive guidance on the implementation of SuDS for controlling water quantity, improving water quality, enhancing amenity or benefitting biodiversity. The Manual provides technical detail on the wide range of SuDS interventions available to practitioners. Such interventions are an integral component part of urban NBS, and this guidance will therefore assist their practical delivery.

Susdrain's 'Other Guidance' Repository signposts a wide range information that covers the technical design components of SuDS, open access design and costing tools, general and surface water management issues, and guidance on green infrastructure for SuDS.

Natural England's Green Infrastructure Standards provides guidance to deliver more multifunctional green infrastructure that specifically addresses inequities in access and quality. Considered within the context of the latest proposed planning reforms, the National Model Design Code and National Design Guide alongside the ambitions of the National Adaptation Programme and Environment Bill, it is likely Natural England's framework will be a key vehicle through which green infrastructure and climate resilience will be addressed, as well as how future standards are understood and promoted. The framework is currently being trialled in ten areas across England.

CASE STUDY:
Considering multiple NBS within brownfield regeneration projects

New Garden Quarter is a new neighbourhood comprised of 471 mixed-tenure homes, developed on brownfield land in Stratford, East London. The project incorporated a SuDS strategy that ensured the inclusion of rain gardens, green roofs and a number nature-positive features and planting interventions across the site that enhance biodiversity, attenuate stormwater and deliver community amenity space. New Garden Quarter utilises multiple NBS to deliver a range of functional ecosystem services, whilst providing spaces for residents and the public to enjoy. Find out more here.

New Garden Quarter by Pollard Thomas Edwards © Nick Kane

Principle 3: Maximise multifunctionality

3.5 MAKE NBS ACCESSIBLE

Accessibility is essential for ensuring the multifunctionality and longevity of NBS, which can be optimised through considered and collaborative approaches to the planning and design stages of NBS implementation. Designing-in accessibility requires:

- A sensitivity and diligence similar to that of ensuring habitat variety and suitability
- A consideration of local social practices and cultural values; the wants and needs of community members or business, as well as their requirements based upon the current use of the space (particularly crucial when retrofitting interventions)

There are a number of business incentives for ensuring the visible and/or physical accessibility of NBS, including:

- Improving employee health, productivity and retention[47,48]
- Increasing commercial trading, patronage and market value[49,50]

Where public accessibility is enhanced, NBS maximise opportunities for interaction, therefore optimising the provision of mental, social and physical health and wellbeing benefits to the wider population. Stakeholders should work to enhance the diversity of their collaborative efforts and aim to maximise the level of community engagement throughout the life of a project. This will work to ensure interventions are suitable and accessible, maximising public interactions and bolstering long-term buy-in (see Principle 5 and Principle 6).

CASE STUDY:
Delivering NBS for people and place

The West Gorton Community Park, in Manchester, was constructed as part of the EU's Horizon2020-funded Grow Green project, which sought to create climate and water resilient, biodiversity-enhancing and liveable cities through investment in NBS that are co-designed by a range of technical stakeholders and local community members. Their 'Seeing is Believing' virtual tour (produced by Groundwork) provides an overview of the completed demonstration project that puts people and place at the forefront of interventions and considers resilience in terms of both climate adaptation and community prosperity.

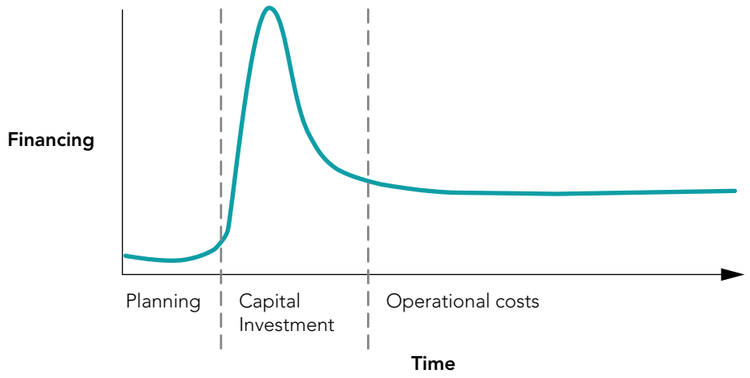
West Gorton Community Park © Manchester City Council

Principle 4: Identify value, costs, benefits and funding

Building NBS into projects can lead to positive opportunities including lowering operational costs, unlocking new revenue streams, increasing customer engagement and delivering public environmental goods. NBS are often more cost effective compared to traditional grey infrastructure alternatives, particularly when accounting for the provision of public goods and non-monetary benefits.[51,52] With regards to new developments, consideration of NBS at the outset of a project should usually abate the substantially higher costs of any necessary retrofitting.

Financing the creation of NBS which benefit business and society will require a blended approach using both private and public finance obtained via early engagement and collaboration. Overall, the principles outlined in this report attempt to incentivise, ease and enhance the availability of private finance opportunities for NBS, where investment and innovation are currently underacknowledged and underutilised. It is therefore essential to identify funding and financial models that support the three phases of NBS financing as outlined below.[53] These phases are applicable to the financing of NBS within both new developments and retrofit projects. This principle will outline current and emerging industry methods available to achieve preliminary and long-term investments for NBS within the built environment.

Planning, Capital Investment and Operational Costs[54]



4.1 INCORPORATE NBS INTO CAPEX AND OPEX AT THE OUTSET

It is essential for CAPEX and OPEX to be built into project budgets at the earliest opportunity, such as within strategic definition. Early incorporation of NBS into CAPEX and OPEX will:

- Overcome the disconnect between short-term investments and long-term funding needs
- Reinforce the position of NBS interventions in the long-term
- Alleviate costs associated with (often more disruptive) grey infrastructural operations
- Ensure opportunities for NBS are not missed – reducing design disruption and any retrofit costs

CASE STUDY:
Quantifying the potential costs and benefits of green roof installation
The IGNITION project has developed a site-specific tool to evaluate the costs and benefits of retrofitting a green roof on a property, which includes financial benefits (such as property value uplift and energy cost savings) and non-financial benefits (such as carbon sequestration and water quality improvements). The project is translating this into a web-based tool that property owners can use to provide them with estimated figures to inform and support their decision making. The project intends to work with large organisations in Greater Manchester to test the efficacy of the tool and evaluate its findings across their property portfolios.

4.2 ASSESS THE VALUE OF ECOSYSTEM SERVICES AND NATURAL CAPITAL

An understanding of the value of ecosystem services and natural capital is essential if the costs and benefits of NBS are to be weighed up appropriately. Calculating existing value baselines or projecting potential uplifts can bolster the case for NBS within strategic decision-making. A wide range of accounting and assessment mechanisms exist, each with their own methodological strengths and limitations. Professional services can be solicited on a project-to-project basis to undertake them. However, the tools below constitute a range of open access means of valuing ecosystem services and natural capital that are recommended by the Ecosystem Knowledge Network:

- Benefits Estimation Tool (B£ST)
- Co$ting Nature
- Green Infrastructure Valuation Toolkit
- Integrated Valuation of Ecosystem Services and Trade-offs (InVEST)
- Natural Capital Planning Tool (NCPT)
- ORVal (Outdoor Recreation Valuation tool)

CASE STUDY:
Asset valuation of ecosystem service provision
The Crown Estate undertook a valuation of the ecosystem services provided on its Windsor Estate. The Total Capital Accounting approach undertaken by Route2 estimated the total valuation at £21 million per annum, broken down into recreation (£14.1m), flood risk mitigation (£2.9m), carbon sequestration (£2.8m) and water quality improvement (£1m). Find out more here.

4.3 ASSESS THE FULL VALUE PROFILE OF DEVELOPMENTS

The Construction Innovation Hub (CIH) Value Toolkit is being created with industry stakeholders and is due for release in spring 2021. It will consist of a suite of tools to support value-based decision making across the property lifecycle. The tool will guide an organisation, programme, or project to determine its tailored value profile and to focus on outcomes, so that value can be determined across Natural, Human, Social, and Produced Capitals for people and society. The Value Toolkit will seek to move beyond regulatory compliance and will include best practice case studies across the built environment.

4.4 USE EVIDENCE BASES TO ENHANCE INVESTOR CONFIDENCE

UK markets for private investment and finance are mature and are capable of funding NBS where there is investor confidence in the cash flows available. Historically, this has focused on NBS projects undertaken at larger scales and when situated outside of the urban realm, such as afforestation or natural flood management interventions.[55] The Government's Green Finance Strategy recognises the need for mechanisms which can unlock private revenue streams for the natural environment. However, acquiring investor confidence requires more active engagement with the investment community to communicate the desirable outcomes from NBS to respective stakeholders.

The following resources comprise supporting evidence and case studies that can, in the short term, be used to build the required investor confidence:

- Nature-based solutions to the climate emergency: Benefits to business and society
- Living Roofs and Walls from policy to practice
- Urban Nature Atlas
- Making the case for green infrastructure: Lessons from best practice
- Financing and Business Models Guidebook
- Taking action for urban nature: Business model catalogue
- The Green Book: Central Government Guidance on Appraisal and Evaluation

CASE STUDY:
A value-based approach to nature-based investment
An Ecosystem Services Assessment (ESA) of Mayesbrook Park (located in the London Borough of Barking and Dagenham) demonstrated that restoration of the 45-hectare park area was both a viable and cost-effective investment. The ESA, conducted by the Environment Agency (EA) and Queen Mary University of London, quantified the benefits associated with the ecosystem service uplift provided by the proposed site restoration. The value of this uplift was estimated to provide a long-term return on investment to society of £7 for every £1 invested in the project. A total of £1,646,000 worth of investment was generated for phase one of the Mayesbrook Climate Change Park restoration, which benefited from the findings of the initial ESA. Find out more here.

Principle 4: Identify value, costs, benefits and funding

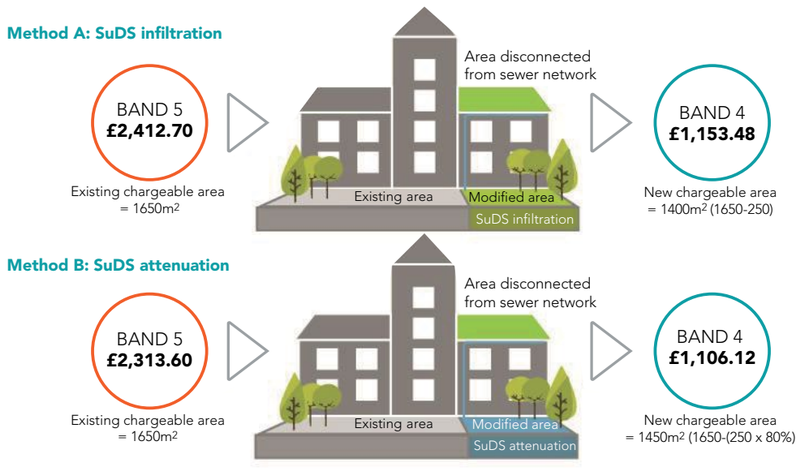
4.5 USE INNOVATIVE FUNDING STREAMS

Moving beyond assessed or assigned values of natural capital or ecosystem services (via ESAs or Natural Capital Assessments), a focal point of much current research is the development of viable funding streams for NBS. Such initiatives aim to translate static monetary valuations of nature into more dynamic investment opportunities that offer returns on investments that are similar in function to more traditional economic models. Once established, such approaches can be used to further support the installation of NBS.

The Scottish Conservation Finance Project's £1 Billion Challenge Route Map outlines a range of innovative investment and funding models for nature. Their aim is to bridge the gap between the growing need to invest in the protection, restoration and enhancement of nature, and the funding available to do so.

CASE STUDY:
Developing an innovative funding stream for SuDS
The IGNITION project is assessing the viability of a range of innovative business cases for multiple NBS. The leading urban investment model in the project is the Sustainable Drainage Solution (SuDS) retrofit proposal, which aims to develop a pipeline of SuDS retrofits across public sector-owned sites in Greater Manchester (GM). The model intends to be 'investible' – such that the capital costs to install SuDS can be repaid through monetising savings in LPA drainage costs and benefits to United Utilities (UU) in the form of reduced sewer overflows and subsequently lower sewer flooding costs. The pipeline will also deliver environmental and social benefits on sites, including reduced surface water runoff, carbon sequestration, habitat creation, and education and health benefits.

At present, a pipeline of sites is being agreed upon via collaboration with UU. The initial pipeline is anticipated to contain 100 to 200 sites (out of a total of 3000 LPA, school, fire and rescue, and NHS properties identified across the GM region), with implementation costs estimated between £2m to £4m. This process aims to overcome the challenges associated with translating the monetary value of nature – in this case SuDS – to site owners and financial stakeholders, such as UU. If successful, the project will finalise a governance model and investment case to approach wider private and public investors. The IGNITION project ends in April 2022 and aims to have secured investment and finalised contracts to implement the initial pipeline of projects by then.



Water retailers can charge an additional 4 – 14% on top of these rates, therefore site owners may be charged more than is outlined here.

4.6 UNLOCK CAPITAL THROUGH GREEN FINANCE

At present, there are a range of mechanisms subsumed under the term 'green finance', which include green bonds, sustainability-linked loans, and private equity funds that support biodiversity, environmental impact bonds, insurance products and other forms of corporate lending.[56] Green bonds and sustainability-linked bonds are forms of corporate or government debt. These function by promising debt investors that the borrower will use the money to either create assets with a higher sustainability performance compared to business-as-usual approaches or upgrade the existing assets.

Green bonds are attractive as they often attract non-core investors and therefore can lead to increased demand and therefore tighter pricing. Sustainability-linked loans and bonds can afford the borrower discounted interest rates if KPIs are reached. The saving from the lower interest rate can therefore promote investment in nature-positive solutions. To date, however, few borrowers have issued green bonds where the use of proceeds has been for NBS. The following metrics can be used to demonstrate the appropriate application of green bonds:

- Biodiversity improvements (achieving net gain across the portfolio)
- Green building improvements (including NBS within design and delivery)
- BREEAM rated buildings (with credits derived from biodiversity improvements)

Logicor's Green Finance Framework sets out what future green bond commitments may look like for investors and how financing biodiversity improvements could work.

The International Capital Market Association Green Bond Principles sets out the core principles of issuing credible green bonds.

The Green Loan Principles (produced by working group of leading financial institution representatives) sets out a clear and concise framework aimed at enabling all market participants to understand the characteristics of green loans in order to promote their development and integrity.

CASE STUDY:
Incentivising green finance investments through ESG-linked Key Performance Indicators
Great Portland Estates (GPE) have established an innovative £450 million revolving credit facility (RCF) with five banks (Santander, NatWest, Wells Fargo, Lloyds Bank plc and Bank of China) that is linked to three ESG Key Performance Indicators (KPIs). The RCF is set at a headline margin of 90 basis points over LIBOR (an inter-bank interest rate) and an annual decrease or increase of up to 2.5 basis points will be applied to this headline margin on the basis of GPE's performance against its ESG KPIs. The KPIs are related to the decarbonisation of GPE's building assets by 2030, and the increase of BNG across their whole asset portfolio. Principally, GPE have set price incentives to deliver net zero ambitions and make BNGs and will pay a lower margin on the RCF if annual KPI targets are met. The ambitious KPIs and subsequent RCF margin swing encourages behavioural change throughout the organisation.

4.7 USE CROWDFUNDING APPROACHES TO GENERATE CAPITAL

Crowdfunding invites a large number of people to contribute small sums of money, which are pooled together to support the delivery of projects. Crowdfunding methods can be utilised to generate whole or partial project funding, which can be directed towards both the delivery and long-term maintenance of NBS interventions.

For existing built environment and town or city-scape improvements and maintenance, crowdfunding can constitute a valuable source of capital generation and community engagement that enhances the longevity of NBS interventions. Within new development projects, utilising crowdfunding may be more complex, however it could be coordinated as an investment round that engages communities and delivers desirable NBS that would otherwise be unaffordable. Crowdfunding techniques may be particularly valuable when attempting to generate initial funding for ongoing NBS maintenance and management plans (see Principle 5).

CASE STUDY:
Crowdfunding for the long-term viability of NBS
MyPark Scotland are a social enterprise which support parks and green space in Scotland. Revenue is generated through crowdfunding from individuals and businesses which goes directly into greening initiatives and an investment strategy to develop long-term viability and endowment funds. They have developed a Crowdfund Resource Kit which provides an introduction to crowdfunding and information on how to run crowdfunding campaigns. This method of raising capital has the added value of public engagement in the project, giving them a greater sense of ownership over it, enhancing long-term buy-in.

4.8 UTILISE THE NEW MARKET FOR BIODIVERSITY NET GAIN

BNG requirements will act as a direct driver for the consideration and implementation of NBS within developments. However, when BNG cannot be created onsite or offsite locally, there will be the option to purchase statutory credits from Government. These credits will then be invested into the creation of biodiversity elsewhere. Money from purchased credits can be pooled together creating a vehicle for LPAs, brokers, landowners or Government to fund nationally significant nature regeneration projects. Purchasing these credits should be a last resort as per the biodiversity mitigation hierarchy (see Section 1.4 here). Biodiversity credits are expected to become a legal requirement in 2023. Once established, this will create a new market for biodiversity whereby credits can be bought and sold.

The Environment Bank provides a range of guidance on the practicalities of biodiversity accounting and offsetting for both developers and landowners.

Principle 5: Create long-term management plans

NBS should not be considered as one-off projects or interventions but should be approached as a long-term investment in the betterment of the built environment for the benefit of both business and communities. Such investments will become increasingly rewarding as time passes, providing they have been planned with the requisite maintenance, management and monitoring plans that will ensure longevity in performance and help build the case for future initiatives. Consideration of the long-term costs of NBS should therefore begin at the outset of the planning stage, as NBS can require technical expertise and (often) specific permissions.

Thorough maintenance plans should establish what long-term inputs are necessary, whose responsibility the requisite actions are, and the proposed means of facilitating them. Such inputs do not have to be financially costly, though require a shift from business-as-usual approaches to OPEX forecasting and methods of NBS management. For example, scaling-back intensive greenspace management practices can save on costs, whilst simultaneously enhancing biodiversity. In addition, fostering 'active citizenship' via collaborative approaches to planning, development and management may well stimulate forms of environmental stewardship from engaged stakeholders such as users or tenants, community members, community interest groups, LPAs or other organisations that will voluntarily assist the delivery of long-term management plans.[57,58]

5.1 RUN MAINTENANCE VOLUNTEER SCHEMES

With NBS maintenance commitments potentially indefinite, asset owners or managers may consider establishing volunteer schemes as part of ongoing management plans. Asset owners and managers should consider:

- Engaging with local community members or interest groups to solicit environmental stewardship
- Tapping into corporate social responsibility campaigns and/or team-building exercises
- Undertaking outreach initiatives with local schools that focus on maintenance provision
- Collaborating and engaging with environmental NGOs and other topic experts (such as those with horticulture and landscaping skills)
- Running crowdfunding campaigns to generate a maintenance budget

Such efforts can subsequently increase the positive health and social impacts of NBS, as well as provide a medium for education, further increasing awareness and understanding of NBS and assisting the communication of its values to a wider audience.

CASE STUDY:
Utilising corporate volunteering and workdays
Groundwork – a federation of community action charities across the UK – runs a range of business-facing environmental volunteering schemes. Groundwork coordinates bespoke volunteering days for professional organisations that help develop internal skills whilst providing connections to local communities and making a visible difference. Interactions can be one-off experiential days, or a programme of activities linked to the same or different sites.

Groundwork currently has a diverse range of volunteering opportunities to engage with across England and they can be found in their Employee Volunteering Booklet. Whilst Groundwork's schemes function towards the development and maintenance of their own projects, the same model could be utilised by a developer, landowner or building owner to run maintenance volunteer schemes for the management of on-site NBS across their own assets and portfolios. A range of other environmental NGOs, such as Wild London or the Woodland Trust also offer similar opportunities.

5.2 USE A LONG-TERM STEWARDSHIP MODEL FOR HABITAT MANAGEMENT

A long-term stewardship model of assets can assist owners in maximising the ongoing benefits that NBS deliver. This model will provide asset owners with an incentive to ensure the longevity of any NBS created. This maintenance could be provided through a partnership with wildlife NGOs such as the Wildlife Trusts and the RSPB or by working with the local community. Comprehensive collaboration and stakeholder engagement throughout the project lifecycle or via outreach efforts post-completion are essential.

The Land Trust work with commercial and residential developers to manage the green infrastructure and greenspace around or adjacent to sites. The Land Trust take land into long-term ownership and management, act as interim site managers, provide upfront design services, engage with local communities, support planning applications, and take on difficult planning conditions.

CASE STUDY:
Establishing long-term investment and management plans for greenspace
Grainger, a developer, investor and operator of housing, used The Land Trust to identify solutions to the long-term management of their green space for Wellesley Woodlands. The Land Trust helped Grainger gain planning consent by identifying a long-term investment plan for suitable alternative natural green space (SANGS).[59] This was done through an endowment and service charge model. Find out more here.

5.3 MONITOR AND EVALUATE NBS INTERVENTIONS

Provisions for legacy engagement with NBS should be factored in at the outset of projects. Monitoring and evaluation of NBS over time is essential, both to ensure their function is optimised, and to enhance both the global and local evidence base. The implementation of NBS is context-specific, shaped in part by overarching policy frameworks, respective economic capacities, the interrelations of engaged stakeholders and the nature of the implementation site. Ensuring that interventions are effectively monitored and evaluated, and that these findings are documented and disseminated, is essential. This will reduce the ambiguity surrounding the implementation of NBS in certain contexts, will highlight good practice, identify where improvements can be made, and will work to further bolster the business case for NBS in the long-term.

The IUCN's guidelines for planning and monitoring corporate biodiversity performance (Chapter 2: Stage 4) provides a comprehensive overview of the key elements for establishing effective monitoring plans.

CASE STUDY:
Monitoring the long-term multifunctionality of NBS retrofits
As part of the European Commission's LIFE+ Programme, collaborative action was taken to climate-proof three housing estates at risk of flooding across the London Borough of Hammersmith and Fulham. Coordinated by Groundwork London in partnership with Hammersmith and Fulham Council, the project utilised a range of NBS to retrofit a SuDS system that takes water from 0.3 hectares of hardstanding and has the capacity to hold 110m^3 of water. Interventions included green roofs, swales, grass basins, raingardens, trenched tree pits and others, which are to be maintained by the LPA, and monitored by the Sustainability Research Institute at the University of East London. These monitoring and evaluation efforts have demonstrated the efficacy of the retrofits in mitigating the flood risk, with one estate recording a 98% drop in peak water flow. In addition, areas with vegetated roofs recorded significantly lower temperatures than non-vegetated roofs, contributing to urban cooling. The collaborative approach and extensive public engagement also fostered forms of community buy-in, with residents able to influence the nature of the NBS interventions, and some engaging with community food growing initiatives across the sites. Find out more here.

Principle 6: Collaborate, educate, and innovate

The beneficiaries of NBS are typically multi-stakeholder and extend beyond those directly involved in their creation. As users of NBS, it is important that citizens foster a relatable understanding of their function and value, which can drive forms of community ownership and shape future market trends. Moving beyond tokenism to embed collaborative practices as business-as-usual is imperative to driving positive change and innovation.

Establishing strong relationships with diverse partners (particularly across Government and between NGOs) can ensure organisations stay ahead of new or upcoming policy developments and are aware of any consultations, both locally and nationally. Collaborating with partners on the progression of industry-wide research and development can assist the creation of approaches and tools that further benefit industry processes and their outcomes for the built environment.

Providing education and training for employees, stakeholders and engaged communities is an integral part of delivering ambitious step-changes. The implementation of NBS at scale will require upskilling those involved in its design, delivery and management, particularly those decision-makers that can accelerate its use in projects. Efforts must therefore be focused internally and externally, to enhance the position of NBS within business and industry practices, as well as in the hearts and minds of communities.

6.1 ESTABLISH RELATIONSHIPS WITH SUITABLE PARTNERS

The most successful NBS projects are those which have worked closely with key stakeholders such as relevant government bodies (both central and local), environmental NGOs, users/ occupants of buildings and infrastructure, and local community members.

The Toolkit for Ecosystem Service Site-based Assessment (TESSA) is a tool tailored towards enhancing collaboration and gathering multi-stakeholder input at a project level.

The Co-Production Guidebook provides methodological insights on how to develop NBS with stakeholders. Whilst the guide focuses on co-production with LPAs, it has transferable lessons that are both relevant and useful when collaborating with other key stakeholders.

The Connecting Nature 'Enterprise Platform' connects stakeholders together. It connects, for example, suppliers of nature with buyers of nature; nature-based enterprises with financers; innovators with those seeking inspiration; policymakers with practitioners; and all stakeholders with the latest evidence and research. The Connecting Nature Partnership have also established knowledge exchange communities specific to NBS for Green Buildings.

There are many industry institutions and NGOs which organisations and/or individuals can join and work with. These include:

- Better Buildings Partnership (BBP)
- Cambridge Institute for Sustainability Leadership (CISL)
- Chartered Institute of Ecology and Environmental Management (CIEEM)
- Chartered Institution of Building Services Engineers (CIBSE)
- Construction Industry Research and Information Association (CIRIA)
- Infrastructure Operators Adaptation Forum (ARCC / Environment Agency)
- Institute of Environmental Management and Assessment (IEMA)
- London Climate Change Partnership (Greater London Authority)
- Supply Chain Sustainability School
- The Landscape Institute (LI)
- UK Green Building Council (UKGBC)

CASE STUDY:
Facilitate co-investment through collaboration
Identifying areas where NBS can provide ecosystems services to multiple stakeholders can facilitate co-investment, providing effective measures towards collaboration and engagement are taken. The IGNITION project is investigating means of facilitating co-investment through collaboration with UU, EA and LPA departments across Greater Manchester. Engagement with UU addresses the potential for reducing strain on sewerage capacity in areas of high surface-water flood risk. With EA, the collaborative efforts are focused around broader local and regional flood-risks. Working with LPAs, particularly Highways departments, IGNITION project partners have been exploring the potential for more innovative use of existing infrastructure budgets.

Considering and assessing the particular ambitions or needs of multiple stakeholders therefore identifies unique opportunities for agendas to overlap and operational synergies to occur. Furthermore, by closely collaborating and engaging with stakeholders who possess and control assets in areas of flood-risk, the case for co-investing in NBS can be made on the grounds of risk mitigation and mutual benefit provision. The IGNITION project is exploring and assessing the necessary governance structures for such co-investment to occur.

6.2 ENGAGE THE LOCAL COMMUNITY

Community engagement is key for the short- and long-term success of any delivered NBS. Local communities should be recognised and considered as those stakeholders who are most impacted by investment in – or changes to – a building, infrastructure, asset or place. These communities are comprised of the people who most frequently interact with that building or place, including residents and/or commercial occupiers. UKGBC's Social Value Framework and Delivering Social Value: Community Engagement Hacked report acknowledge the impact that buildings, infrastructures and landscapes have on people and provide guidance for built environment stakeholders on how best to define and deliver social value across their operations.[60]

There are also a number of organisations which can help asset owners engage with local communities on NBS-related issues, such as the Royal Horticultural Society, Groundwork and Business in the Community.

6.3 SHARE RESOURCES AND LESSONS LEARNT

Consider sharing your learnings with wider industry as to what works, and importantly, what does not work. As well as presentations and written case studies, site tours, be they physical or virtual, can be a powerful means of demonstrating success, building support and inspiring future action.

The institutions and NGOs listed above often provide on-line and in-person formats through which case studies and other learnings can be shared.

NetworkNature acts as a repository for knowledge sharing on NBS including lessons learnt, good practice, and business cases. It combines the functions of ICLEI Europe, IUCN, BiodivERsA, Oppla and Steinbeis 2i aims to expand the wider NBS community, strengthen the evidence base and accelerate the uptake of NBS.

Furthermore, utilising secondments presents an effective way to break down silos and enable the inflow of knowledge to an organisation. Seconding an organisation's own staff or receiving seconded staff can create an enabling environment where organisations better understand common challenges and can help build knowledge networks internally and externally. Organisations can utilise NetworkNature to identify suitable secondment opportunities.

CASE STUDY:
Virtual exploration of urban NBS interventions
The University of Salford's Living Lab coordinates tours to showcase how NBS can be used, and the real time benefits they provide. During the COVID-19 pandemic, a virtual tour of the Living Lab's rain garden has been filmed and produced for circulation online. Whilst such interaction may limit material connections with NBS, the virtual tours provide a valuable dissemination tool that can draw on a far larger audience and have greater longevity than their physical alternatives.

6.4 UTILISE INTERNAL COMMUNICATIONS CHANNELS

Existing systems should be used to share knowledge and where possible new systems can be created to fill gaps. Internally, communication channels can be used to engage and empower employees. Internal communication can lead to the identification of NBS-champions in different departments that are necessary for promoting inter-departmental collaboration that dismantles operational silos.

6.5 USE EXTERNAL TRAINING COURSES AND WORKSHOPS

Within the context of an ever-changing policy landscape and advancing industry and community expectations, it is important to remain up to date with the latest requirements and thinking. The volume of online and in-person learning courses for NBS has never been greater. In particular, organisations such as the UKGBC, IEMA, CIEEM, CIRIA, The Landscape Institute and the Supply Chain Sustainability School offer a huge range of content, some of which is free to access. Learnings can often constitute Continued Professional Development (CDP) as required by many professional institutions.

The We Value Nature campaign offers multiple open access training programmes and learning modules that are focused on natural capital. The courses have been designed for business and organisations that are in the initial stages of incorporating natural capital principles and practices into their decision-making.

NBS for disaster and climate resilience is a free on-line course from Connecting Nature. The course outlines why NBS are important, how they can be utilised within policy and practice, and how they complement existing grey infrastructure to enhance resilience and reduce climatic risks.

CASE STUDY:
Engaging leaders of industry to drive innovation
Leadership is absolutely critical to UKGBC's mission to radically improve the sustainability of the built environment, and our Leaders Network consists of like-minded individuals dedicated to driving transformational change across the sector. It is made up of over 150 CEOs and Board Executives from UKGBC member organisations who come together on a quarterly basis to learn and network. Through the network, we provide inspiration and share stories and insights about sustainability leadership to instil a collective sense of purpose. We want to create a common vision – that of a built environment that enables both people and planet to thrive.

6.6 SUPPORT INDUSTRY-WIDE RESEARCH AND INNOVATION EFFORTS

There are many industry-wide and collaborative research initiatives working to deliver innovative tools and/or solutions that benefit industry professionals and the built environment more broadly. Assessing partnership opportunities with research institutions and NGOs (such as those listed above) is a good place to start.

Furthermore, the following topics have been identified as possessing significant potential, but are in need of further research:

- Pension schemes and corporate green bonds which invest in NBS
- A standardised climate resilience metric
- Climate change adaptation standards and indicators
- Blue space standards
- GIS mapping of private, public and commercial greenspaces to score local areas
- Monitoring and auditing of ENG
- Management plan retention in sites/land change of ownership
- Trade-offs between NBS and other sustainability measures
- Process for the creation of ENGs through NBS
- Responsibility distribution between landlord and tenant
- Shaping future policy and guidance to aid LPAs and government organisations
- Optimising and maximising the environmental benefits of cultivated plant genetic resources and landscapes, including domestic gardens
- Optimising and maximising the health benefits of cultivated plant genetic resources and landscapes, including domestic gardens
- Optimising indoor greenspace for health benefits
- A standardised physical, mental and social value metric for NBS

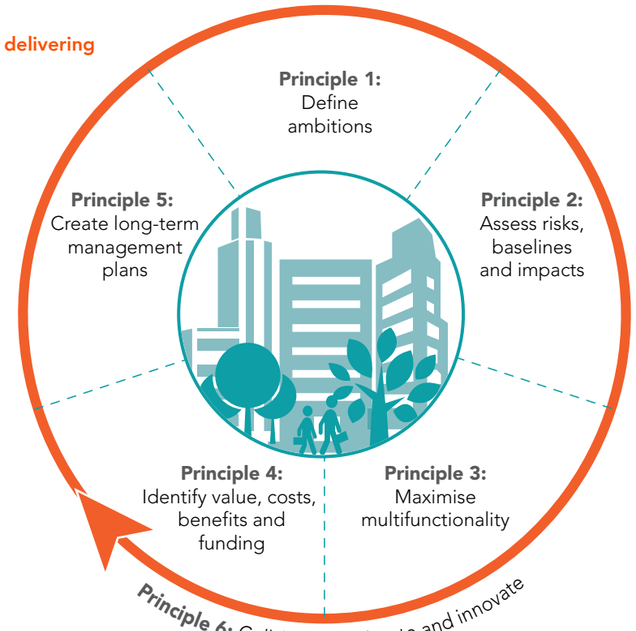
CASE STUDY:
Use collaboration to set industry standards and enhance engagement
The Royal Horticultural Society's (RHS) 'Plants for Pollinators' work demonstrates how collaboration between industry stakeholders and engagement with community members can influence the consumer practices of individuals to collectively provide vast biodiversity benefits to nature and society. Working with experts and drawing on a range of scientific evidence, RHS have identified a range of year-round flowering Plants for Pollinators to tackle the decline in pollinator numbers. In developing the Plants for Pollinators registered trademark and logo, RHS have created an ecosystem service product line, which has increased plant sales that benefit both pollinators and the economic bottom line of the horticulture industry. The Plants for Pollinators lists (covering garden plants, wildflowers and plants of the world) will continue to evolve and be improved as research and collaboration continues. At present, they constitute some of the best cultivated and wild plants for gardeners to grow to attract a wide range of pollinating insects, and these lists could be utilised to inform plant species selection in the design and delivery of NBS.

Next steps

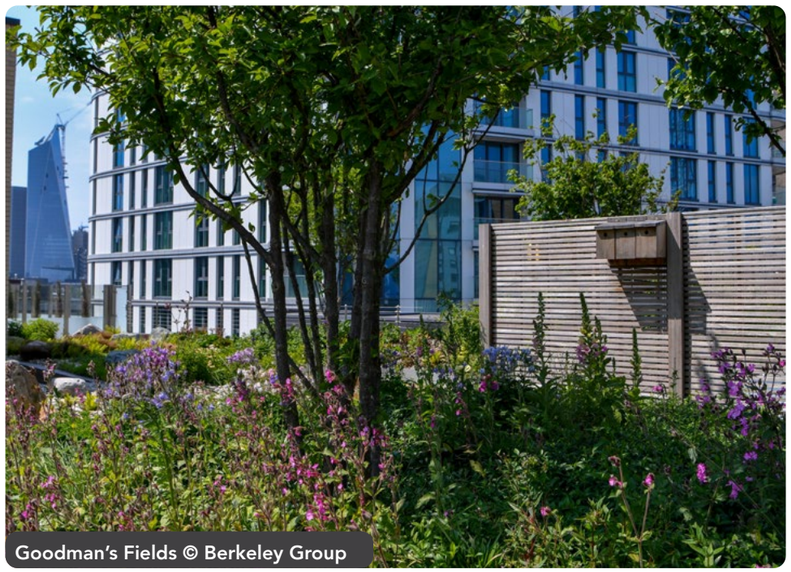
We hope the UKGBC ambition statement on prioritising NBS and the principles set out in this report can be the catalyst that drives the built environment industry to produce new products and provide new services that increase the use of NBS through the design, delivery, and operation of buildings and infrastructure. What is required now is a re-evaluation of how we shape the urban environment moving forward, utilising these opportunities to respond to the climate and ecological crises, whilst simultaneously maximising the gains for our economy and society to ensure an equitable and sustainable post-COVID recovery.

Following the publication of this guidance, UKGBC will continue to work with industry on the topics of climate resilience, ENG, and NBS. We will focus on collaborative activities that will provide the industry with guidance and solutions to our shared challenges.

Principles for delivering urban NBS



Appendix A: Further case studies

Principle	Method	Case Study
Principle 1	**Align with the UN Sustainable Development Goals**	**Using the SDGs to inform strategic frameworks** The London Sustainable Development Commission (LSDC) have used the SDGs as a measure to assess the state of London's social, economic and environmental wellbeing and evaluate any progress. In addition, the LSDC released an insights paper on the role of the SDGs in enabling a 'fair' and 'green' recovery following the Covid-19 pandemic. Within it, the LSDC has utilised the SDGs as the baseline for the development of a strategic recovery framework that advocates for more high quality and energy efficient homes, enhanced urban green spaces, greater investment in green business and greater stimulus and support for green investments – all of which could incorporate the principles and practices of NBS to assist their realisation.
Principle 3	**Maximise appropriate habitat variety**	**Considering horticultural diversity within new urban developments** Goodman's Fields is a 2.83-hectare development in Aldgate, London. The design has been optimised for climate change adaptation and biodiversity enhancements. The design of the living roof was based on a chalk meadow, which ensured appropriate habitats were incorporated for the micro-climate created on the roof. The 'wildlife sky gardens', designed in partnership with London Wildlife Trust (who visited the roofs after installation to verify the planting mix), incorporate habitats not usually found on an inner-city rooftop, including: • Alpine brownfield – a mix of low growing UK native perennials • Chalk meadow – a mix of native wildflower and grasses • Dry acid heathland – a mix of heathers with native UK grasses and grassland perennials • Pebble beds to capture rainwater Goodman's Fields demonstrates how NBS can be used to enhance the biodiversity of new build developments in dense urban areas.  Goodman's Fields © Berkeley Group

Principle	Method	Case Study
Principle 4	**Use evidence bases to enhance investor confidence**	**The economic impact of ornamental horticulture and landscaping in the UK** Research by Oxford Economics found that the UK's ornamental horticulture industry contributed £24.2billion to GDP in 2017, and employed 568,700 individuals. The findings demonstrate the immense value of the UK's parks and gardens and further bolster the case for the protection and/or enhancement of our urban greenspaces.
Principle 5	**Use a long-term stewardship model for habitat management**	**Engaging communities to develop long-term funding streams** At Barking Riverside, a resident run Community Interest Company (CIC) was established to manage and maintain community assets including natural capital. The CIC is currently funded by the proceeds of ground-rents, which have delivered a new garden for children at school to grow food and connect to nature. Find out more here.
Principle 6	**Establish relationships with suitable partners**	**Multi-stakeholder collaboration for long-term environmental regeneration** Woodberry Down is a long-term regeneration project of a social housing estate, in Manor House, Hackney that commenced in 2009. Situated adjacent to the New River and two open water reservoirs spanning across 17 hectares, a key milestone in this long-term project was the opening of Woodberry Wetlands in 2016, which integrated the landscape with Woodberry Down. The nature reserve, developed by London Wildlife Trust in partnership with Thames Water, Berkeley Homes and Hackney Council, has enabled this wetland to be open to the community for the first time since the reservoir was built in 1833. The £1bn regeneration scheme is an example of effective partnership working between multisector stakeholders, including: • Berkeley Homes North East London (developer) • London Borough of Hackney (landowner) • Manor House Development Trust (supporting community development) • Woodberry Down Community Organisation (residents association), and • Notting Hill Genesis (affordable housing landlord).  Woodberry Wetlands © Don Lewis

Principle	Method	Case Study
	**Use external training courses and workshops**	**CPD training for SuDS design, implementation and management** Organisations that are looking to upskill their workforce and get ahead in SuDS good practice can sign up to a number of training programmes coordinated by CIRIA. The association has opportunities for learning and development across its SuDS Foundation, Designing SuDS and Constructing & inspecting SuDS programmes, with training delivered virtually. Find out more here. **Learning and development opportunities for built environment stakeholders** The UKGBC's Learning and Development (L&D) programme offers you more accessible ways to help you make progress on your personal development, expand your understanding of sustainability in the built environment, and deepen your skills and application of those skills in your day-to-day work. The UKGBC L&D programme is both diverse and comprehensive – delivered across four levels of learning and includes a wide variety of content and delivery mechanisms: Level 1: Raising Awareness Level 2: Building Knowledge Level 3: Developing Expertise Level 4: Driving Change This range of learning levels gives you the flexibility to approach key topics and emerging practice at a level that is right for you. Whatever you chose as your starting point, our courses enable you to develop new skills to make positive change on your projects, helping your business stand out as a sustainability leader. Contact to find out more: learning@ukgbc.org

Principle	Method	Case Study
	**Engage with industry-wide research and innovation efforts**	**Advancing innovation and translating policy via collaborative tool development** WSP, in partnership with the Ecosystems Knowledge Network have acted in response to the Government's introduction of ENG requirements in addition to BNGs. They propose the collaborative development of an industry-wide tool for measuring and operationalising ENGs. The Net Gain Planning Tool (NGPT) Project aims to develop a tool that: 1. Is appropriate across the whole UK 2. Combines the best features of existing tools 3. Adds value by assessing physical and mental health benefits 4. Is evidence-based and easy to use and implement 5. Provides easily interpretable outcomes 6. Determines whether a project achieves net gains for the environment in relation to locally defined priorities 7. Allows pre-definition of what is expected from new development in terms of net gains which enhances planning security for developers 8. Sets incentives for going above and beyond minimum net-gain requirements The project therefore aims to co-develop an industry-relevant tool that can meet context-specific requirements, something that no current tool delivers. The NGPT Project presents an opportunity for industry actors to engage with the development of a tool that benefits them, considering unique stakeholder requirements and circumstances and factoring them in accordingly. Find out more here.

Appendix B: Index of tools and guidance

Method	Tools
Set targets for climate adaptation and ecological uplift	National Adaptation Programme Science-Based Targets for Nature
Measure changes and disclose on climate-related risks	Planetrics Climate Risk Model MSCI's Climate Value-at-Risk Assessment Task force on Climate related Financial Disclosures (TCFD) UK Climate Projections (UKCP)
Measure and disclose on nature-related risks	Task Force for Nature-related Financial Disclosures (TNFD)
Measure the changes in biodiversity	Biodiversity Metric Ecological Impact Assessment (EcIA) Environmental Impact Assessment (EIA) Friends of the Earth EIA Guidance
Assess the function of ecosystem services	Artificial Intelligence for Ecosystem Services (ARIES) Eco-Metric EcoServ-GIS Ecosystems Knowledge Network Tool Assessor i-Tree Eco Greenkeeper Spatial Evidence for Natural Capital Evaluation (SENCE)
Enabling a natural capital approach	Enabling a Natural Capital Approach (ENCA) Natural Capital Protocol (NCP)
Assess the functionality of NBS	Urban Greening Factor (UGF) Green Space Factor (GSF)
Assess the quality of NBS	Building with Nature Wildlife Trust Biodiversity Benchmark
Understand the multiple benefits of NBS	IGNITION Evidence Database
Create interconnected habitats	Local Nature Recovery Strategies Towards A Wilder Britain
Maximise appropriate habitat variety	Connecting Nature Framework Guidebook Mosaic Approach UK Biodiversity Indicators 2020

Method	Tools
Create multifunctional NBS	CIRIA SuDS Manual IGNTION NBS to the Climate Emergency Report Natural England Green Infrastructure Standards Susdrain 'Other Guidance' Repository Urban Greening for Biodiversity Net Gain: A Design Guide
Assess the value of ecosystem services and natural capital	Benefits Estimation Tool (B£ST) Co$ting Nature Green Infrastructure Valuation Toolkit Integrated Valuation of Ecosystem Services and Trad-offs (InVEST) Natural Capital Planning Tool (NCPT) ORVal (Outdoor Recreation Valuation tool
Assess the full value profile of developments	Construction Innovation Hub Value Toolkit
Use evidence bases to enhance investor confidence	Financing and Business Models Guidebook Living Roofs and Walls from policy to practice Making the case for green infrastructure: Lessons from best practice Nature-based solutions to the climate emergency: Benefits to business and society Taking action for urban nature: Business model catalogue The Green Book: Central Government Guidance on Appraisal and Evaluation Urban Nature Atlas
Use innovative funding streams	£1 Billion Challenge Route Map IGNITION
Unlock capital through green finance	Green Loan Principles International Capital Market Association: Green Bond Core Principles Logicor Green Finance Framework
Use crowdfunding approaches to generate capital	MyPark Scotland Crowdfund Resource Kit
Utilise the new market for biodiversity net gain	Environment Bank
Run maintenance volunteer schemes	Groundwork Employee Volunteering Booklet
Use a long-term stewardship model for habitat management	The Land Trust
Monitor and evaluate NBS interventions	IUCN Guidelines for planning and monitoring corporate biodiversity performance

Method	Tools
Establish relationships with suitable partners	Co-Production Guidebook Enterprise Platform NBS for Green Buildings Toolkit for Ecosystem Service Site-based Assessment (TESSA)
Engage the local community	UKGBC Delivering Social Value: Community Engagement Hacked UKGBC Framework for Defining Social Value
Share resources and lessons learnt	Better Buildings Partnership (BBP) Cambridge Institute for Sustainability Leadership (CISL) Chartered Institute of Ecology and Environmental Management (CIEEM) Chartered Institution of Building Services Engineers (CIBSE) Construction Industry Research and Information Association (CIRIA) Infrastructure Operators Adaptation Forum (ARCC / Environment Agency) Institute of Environmental Management and Assessment (IEMA) London Climate Change Partnership (Greater London Authority) NetworkNature Supply Chain Sustainability School The Landscape Institute (LI) UK Green Building Council (UKGBC)
Use external training courses and workshops	CIEEM Biodiversity Net Gain Guidance CIRIA Constructing & inspecting SuDS CPD CIRIA Designing SuDS CPD CIRIA SuDS Foundation CPD Connecting Nature NBS training We Value Nature
Engage with industry-wide initiatives	Net Gain Planning Tool (NGPT) Project RHS Plants for Pollinators

Appendix C: Further reading

FUNDING AND FINANCIAL MODELS

European Investment Bank – Investing in Nature: Financing Conservation and Nature-based Solutions

Broadway Initiative – Accelerating Investment in Nature-Based Solutions

Green Alliance – New markets for land and nature: How Natural Infrastructure Schemes could pay for a better environment

Nature Insurance Value: Assessment and Demonstration

MEASUREMENT AND REPORTING

Cambridge Institute for Sustainability Leadership – Measuring business impacts on nature: A framework to support better stewardship of biodiversity in global supply chains

Good Homes Alliance – Overheating in new homes: Tools and guidance for identifying and mitigating early stages of overheating risk in new homes

Met Office – Meteorological Office Rainfall and Evaporation Calculation System

Environmental Valuation Reference Inventory

Imperial College London – Integrating green and blue spaces into our cities: Making it happen

Natural England – Microeconomic Evidence for the Benefits of Investment in the Environment 2

A Framework for assessing and implementing the co-benefits of nature-based solutions in urban areas

Innovate UK – The business case for adapting buildings to climate change: Niche or mainstream?

DEFRA – Natural Capital Committee research: corporate natural capital accounting

Connecting Nature – Nature-based solution evaluation indicators: Environmental Indicators Review

ADAPTING AND TRANSLATING POLICY

The Green Roof Organisation – The GRO Green Roof Code

Climate Change Committee – Climate Change Risk Assessment 2022

Nature-Based Solutions for Urban Climate Change Adaptation: Linking Science, Policy, and Practice Communities for Evidence-Based Decision-Making

Examining the policy needs for implementing nature-based solutions in cities: Findings from city-wide transdisciplinary experiences in Glasgow (UK), Genk (Belgium) and Poznań (Poland)

BUSINESS MODELS AND PROCESSES

ThinkNature – Nature-based solutions handbook

Greater London Authority – Living Roofs and Walls: Technical Report: Supporting London Plan Policy

EKLIPSE – An impact evaluation framework to support planning and evaluation of nature-based solutions projects

Blue Green Solutions: The Guide

Technology Strategy Board – Design for future climate: Opportunities for adaptation in the built environment

Transport for London – SuDS in London a Design Guide

CIRIA – The benefits of large species trees in urban landscapes: a costing, design and management guide

The Royal Society and Royal Academy of Engineering – Greenhouse gas removal

The Trees and Design Action Group – Various Resources

Appendix D: Acknowledgements

Authors: UKGBC – **Robert Winch** and **Christopher Moss**

Editor: UKGBC – **Alastair Mant**

STEERING GROUP:

Brick By Brick – Ciara Hanson
Canary Wharf Group – Kristina Arsenievich
Cundall – Kavita Kumari
Greengage Environmental – Morgan Taylor
Groundwork – Fiona Brenner
Greater London Authority – Peter Massini
ISG – Ian Fuller
Logicor – Eva Gkenakou
London Wildlife Trust – Mathew Frith
McGregor Coxall – Michael Cowdy
Met Office – Tom Butcher
University of East London – Stuart Connop
Tritax Big Box – Helen Drury
WSP – Tom Butterworth

PEER REVIEW GROUP:

Barratt Developments PLC – Helen Nyul
Berkeley Group – Louise Clarke
Federated Hermes – Robert Hall
Telford Homes – Andrew Day, John Dwyer
Building with Nature – Gemma Jerome
The Crown Estate – Jane Wakiwaka
Transport for London – Katherine Drayson
Redrow PLC – Nicola Johansen

SUPPORTERS:

Business in the Community
CIRIA
Construction Innovation Hub
Green Finance Institute
Landscape Institute
The Land Trust
Royal Horticultural Society

INTERVIEW PARTICIPANTS:

AECOM – Joe Franklin
Arup – Emily Woodason
Aviva Investors Global Services – Stanley Kwong
Balfour Beatty – Julia Baker
Berkeley Group – Louise Clarke
BRE – Richard Cobb
Building with Nature – Gemma Jerome
BuroHappold Engineering – Adarsh Varma
BuroHappold Engineering – Jenny Ross
BuroHappold Engineering – Rob Cooke
Cundall – Simon Wyatt
DEFRA – Liam Robson
DEFRA – Mariella de Soissons
Design Council – Sue Morgan
Eight Associates – Stacy Cougill
Environment Agency – Matt Ellis
Grosvenor Britain & Ireland – Emily Hamilton
Heathrow Airport – Michael Murphy
High Speed Two – Alison Walker
High Speed Two – David Prys-Jones
Natural England – Nick White
Peel Land & Property – Jo Holden
The Crown Estate – Jane Wakiwaka
Telford Homes – Andrew Day
Telford Homes – John Dwyer
Transport for London – Katherine Drayson
UCL – Yolande Barnes
University of Surrey – Prashant Kumar
WSP – Laura Homfray
WSP – Jenny Merriman

This report has been made possible due to funding from the John Ellerman Foundation

WORKSHOP PARTICIPATING ORGANISATIONS:

BDP
Building with Nature
Built Environment Design Partnership
BuroHappold Engineering
Burges Salmon
Business in the Community
Canary Wharf Group
CBRE Global Investors
CIRIA
Cundall
Design Council
Earthwatch
Environment Agency
Grainger
Heathrow Airport
Heyne Tillett Steel
Hoare Lea
ICLEI – Local Governments for Sustainability
ISG
LB Hounslow
London Wildlife Trust
Met Office
Middlemarch Environmental
Ramboll
Skidmore, Owings & Merrill
Sweco
The Concrete Centre
TP Bennett
Transport for London
Tritax Big Box
University of Manchester
University of Oxford
University of Salford
Useful Projects
Willmott Dixon
WSP

QUESTIONS AND FEEDBACK

We welcome input from any interested stakeholders from across the building value chain on the content of this guidance and any future revisions.

Please contact alastair.mant@ukgbc.org.

References

1 HM Government (2018). A Green Future: Our 25 Year Plan to Improve the Environment. HMG, London, UK.

2 Department for Environment, Food and Rural Affairs (2020. Draft Environment Bill: Explanatory Notes. DEFRA, London. [online] Available at: https://publications.parliament.uk/pa/bills/cbill/58-01/0009/20009.pdf [Accessed: 18/03/21].

3 Connecting Nature (2020). Finance and Business Models Guidebook. [online] Available at: https://connectingnature.eu/sites/default/files/images/inline/Finance%20and%20Business%20Models%20Guidebook.pdf [Accessed: 18/03/21].

4 Center for Climate and Energy Solutions (2019). Climate Resilience Portal. [online] Available at: https://www.c2es.org/content/climate-resilience-overview/ [Accessed: 25/01/21].

5 CIEEM (2018). Guidelines for ecological impact assessments in the UK and Northern Ireland, 3rd edition. Chartered Institute of Ecology and Environmental Management, Winchester, UK.

6 Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Current State and Trends, Volume 1. [online] Available at: https://www.millenniumassessment.org/documents/document.766.aspx.pdf [Accessed: 18/03/21].

7 HM Government (2018). A Green Future: Our 25 Year Plan to Improve the Environment. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf [Accessed: 04/01/21].

8 EIC (2019). Delivering environmental net gain: An EIC position paper. [online] Available at: http://www.eic-uk.co.uk/wp-content/uploads/2020/02/EIC-Report-Delivering-environmental-net-gain-2019.pdf [Accessed: 04/01/21].

9 CFA Institute (2015). Environmental, Social and Governance issues in investing: A guide for investment professionals. [online] Available at: https://www.cfainstitute.org/-/media/documents/article/position-paper/esg-issues-in-investing-a-guide-for-investment-professionals.ashx [Accessed: 18/03/21].

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

11 Climate Change Committee (2020). Local Authorities and the Sixth Carbon Budget. CCC, London, UK.

12 Natural Capital Committee (2016). Natural capital protocol. NCC, London, UK.

13 European Commission (2020). Nature-based Solutions. [online] Available at: https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en [Accessed: 16/11/2020].

14 UK Green Building Council (2019). Net Zero Carbon Buildings: A Framework Definition. [online] Available at: https://www.ukgbc.org/wp-content/uploads/2019/04/Net-Zero-Carbon-Buildings-A-framework-definition.pdf [Accessed: 18/03/21].

15 Connecting Nature (2020). Finance and Business Models Guidebook. [online] Available at: https://connectingnature.eu/sites/default/files/images/inline/Finance%20and%20Business%20Models%20Guidebook.pdf [Accessed: 18/03/21].

16 IPCC (2018). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Intergovernmental Panel on Climate Change. [online] Available at: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf [Accessed: 03/03/21].

17 Environmental Audit Committee (2018). Heatwaves: Adapting to Climate Change. [online] Available at: https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/826/826.pdf [Accessed: 16/10/2019].

18 Environment Agency (2019). Draft National Flood and Coastal Erosion Risk Management Strategy for England. [online] Available at: https://consult.environment-agency.gov.uk/fcrm/national-strategy-public/user_uploads/fcrm-strategy-draft-final-1-may-v0.13-as-accessible-as-possible.pdf [Accessed: 05/10/2020].

19 Met Office (2019). UK Climate Projections. [online] Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index [Accessed: 16/10/2019].

20 (Hill, T. (2021). Study attributes 1,500 UK deaths and $9bn of damage to climate change since 2000. [online] Available at: https://www.businessgreen.com/news/4027849/study-attributes-500-uk-deaths-usd9bn-damage-climate-change-2000 (Accessed: 10/03/21)

21 Kovats, R.S., and Osborn, D., (2016) UK Climate Change Risk Assessment Evidence Report: Chapter 5, People and the Built Environment. Contributing authors: Humphrey, K., Thompson, D., Johns. D., Ayres, J., Bates, P., Baylis, M., Bell, S., Church, A., Curtis, S., Davies, M., Depledge, M., Houston, D., Vardoulakis, S., Reynard, N., Watson, J., Mavrogianni, A., Shrubsole, C., Taylor, J., and Whitman, G. Report prepared for the Adaptation Sub-Committee of the Committee on Climate Change, London. [online] Available at: https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf [Accessed on: 03/03/21].

22 Committee on Climate Change (2019). Net Zero: The UK's contribution to stopping global warming. [online] Available at: www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf [Accessed: 03/03/21].

23 HM Treasury (2020). Net Zero Review: Interim Report. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945827/Net_Zero_Review_interim_report.pdf [Accessed 03/03/21].

24 Global Alliance for Buildings and Construction (2020). 2020 Global Status Report for Buildings and Construction: Towards a zero-emissions, efficient and resilient buildings and construction sector. [online] Available at: https://globalabc.org/news/launched-2020-global-status-report-buildings-and-construction [Accessed: 04/01/21].

25 Committee on Climate Change (2019). Net Zero: The UK's contribution to stopping global warming. [online] Available at: www.theccc.org.uk/ wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to- stopping-global-warming.pdf [Accessed 04/01/21].

26 Committee on Climate Change (2019). UK housing: Fit for the future? [online] Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf [Accessed: 03/03/21].

27 WWF (2020). Living Planet Report 2020 – Bending the curve of biodiversity loss. Almond R. E. A., Grooten M. and Petersen T. (Eds). WWF, Gland, Switzerland.

28 The State of Nature Partnership. (2019). The State of Nature 2019. Hayhow D. B., Eaton M. A., Stanbury A. J., Burns F., Kirby W. B., Bailey N., Beckmann B., Bedford J., Boersch-Supan P. H., Coomber F., Dennis E. B., Dolman S. J., Dunn E., Hall J., Harrower C., Hatfield J. H., Hawley J., Haysom K., Hughes J., Johns D. G., Mathews F., McQuatters-Gollop A., Noble D. G., Outhwaite C. L., Pearce-Higgins J. W., Pescott O. L., Powney G. D. and Symes N. (Eds).

29 World Economic Forum (2021) The Global Risks Report 2021. [online] Available at: http://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf [Accessed: 03/03/2021].

30 Braubach, M., Egorov, A., Mudu, P., Wolf, T., Ward W Thompson, C. and Martuzzi, M. (2017). Effects of Urban Green Space on Environmental Health, Equity and Resilience, in Kabisch, N., Korn, H., Stadler, J. and Bonn, A. Nature-based Solutions to Climate Change Adaptation in Urban Areas Linkages between Science, Policy and Practice, pp. 187 – 206. Springer, Cham, Switzerland.

31 Science-Based Targets for Nature Network (2020). Science-Based Targets for Nature: Initial Guidance for Business. Available at: https://sciencebasedtargetsnetwork.org/wp-content/uploads/2020/09/SBTN-initial-guidance-for-business.pdf [Accessed: 06/01/21].

32 Aether (2021). Progress towards UK local climate emergency targets. [online]. Available at: https://www.aether-uk.com/Resources/ClimateEmergencies (Accessed: 27/02/21).

33 HM Treasury (2021). The Economics of Biodiversity: The Dasgupta Review. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf [Accessed: 01/03/21].

34 UK Green Building Council (2019). Climate resilience and embracing nature: An ambition for the built environment. [online] Available at: https://www.ukgbc.org/wp-content/uploads/2019/11/Climate-resilience-and-embracing-nature-An-ambition-for-the-built-environment.pdf [Accessed: 03/03/21].

35 Kabisch, N., Korn, H., Stadler, J. and Bonn, A. (2017). Nature-based Solutions to Climate Change Adaptation in Urban Areas Linkages between Science, Policy and Practice. Springer, Cham, Switzerland.

36 Perez, G., and Perini, K. (2018). Nature Based Strategies for Urban and Building Sustainability (1st Edition). Butterworth-Heineman, Oxford.

37 EIC (2019). Delivering environmental net gain: An EIC position paper. [online] Available at: http://www.eic-uk.co.uk/wp-content/uploads/2020/02/EIC-Report-Delivering-environmental-net-gain-2019.pdf [Accessed 04/01/21].

38 Department for Environment, Food and Rural Affairs (2018). The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting: Making the country resilient to a changing climate. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727252/national-adaptation-programme-2018.pdf [Accessed: 07/01/21].

39 The Economist Intelligence Unit (2015). The cost of inaction. [online] Available at: https://eiuperspectives.economist.com/sustainability/cost-inaction [Accessed: 20/10/2020].

40 HM Treasury (2020). UK joint regulator and government TCFD Taskforce: Interim Report and Roadmap. [online] Available at: https://www.gov.uk/government/publications/uk-joint-regulator-and-government-tcfd-taskforce-interim-report-and-roadmap [Accessed: 24/02/21]

41 TCFD (2020) Task Force on Climate-related Financial Disclosures Overview. [online] Available at: https://www.fsb-tcfd.org/wp-content/uploads/2020/03/TCFD_Booklet_FNL_Digital_March-2020.pdf [Accessed: 27/10/20].

42 Cameron, R. W. F. and Blanuša, T. (2016) Green infrastructure and ecosystem services – is the devil in the detail? Annals of Botany, Volume 118, Issue 3, Pages 377–391, https://doi.org/10.1093/aob/mcw129

43 Sinnett, D., Jerome, G., Burgess, S., Smith, N., Mortlock, R. (2017). Building with nature - a new benchmark for green infrastructure. Town and Country Planning 86.

44 Connecting Nature (2020). Technical Solutions Guidebook. [online]. Available at: https://connectingnature.eu/sites/default/files/images/inline/First%20version%20guidebook%2031%20July%202020.pdf [Accessed: 24/02/21].

45 Kabisch, N., Korn, H., Stadler, J. and Bonn, A. (2017). Nature-based Solutions to Climate Change Adaptation in Urban Areas Linkages between Science, Policy and Practice. Springer, Cham, Switzerland.

46 Raymond, C.M., Berry, P., Breil, M., Nita, M.R., Kabisch, N., de Bel, M., Enzi, V., Frantzeskaki, N., Geneletti, D., Cardinaletti, M., Lovinger, L., Basnou, C., Monteiro, A., Robrecht, H., Sgrigna, G., Munari, L. and Calfapietra, C. (2017). An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Centre for Ecology & Hydrology, Wallingford, United Kingdom

47 Nieuwenhuis M., Knight C., Postmes T. and Haslam S.A. (2014). The relative benefits of green versus lean office space: Three field experiments. Journal of Experimental Psychology: Applied, 20(3), p.199.

48 Kaplan R. (1993). The role of nature in the context of the workplace. Landscape and urban planning, 26(1-4), pp.193-201.

49 GreenBlue Urban (2018). Street Tree Cost Benefit Analysis. [online] Available at: https://www.treeconomics.co.uk/wp-content/uploads/2018/08/GBU_Street-Tree-Cost-Benefit-Analysis-2018.pdf [Accessed: 10/01/21].

50 Department of the Environment (1997). Managing Urban Spaces in Town Centres: Good Practice Guide. Department of the Environment, London.

51 Somarakis G., Stagakis S., and Chrysoulakis N. (2019). ThinkNature Nature-Based Solutions Handbook. ThinkNature project funded by the EU Horizon 2020 research and innovation programme under grant agreement No. 730338. doi:10.26225/jerv-w202

52 Trinomics and IUCN (2019). Approaches to financing nature-based solutions in cities. Working document prepared in the framework of the Horizon 2020 project GrowGreen.[online] Available at: http://growgreenproject.eu/wp-content/uploads/2019/03/Working-Document_Financing-NBS-in-cities.pdf [Accessed: 24/02/21].

53 Connecting Nature (2019). Nature-based Solutions Business Models Canvas Guidebook. [online] Available at: https://connectingnature.eu/sites/default/files/downloads/NBC-BMC-Booklet-Final-%28for-circulation%29.pdf [Accessed: 12/10/2020].

54 Connecting Nature (2020). Finance and Business Models Guidebook. [online] Available at: https://connectingnature.eu/sites/default/files/images/inline/Finance%20and%20Business%20Models%20Guidebook.pdf [Accessed: 24/02/21].

55 Young D., Lockhart-Mummery, E., and Thompson, G. (2020). Accelerating Investment in Nature-Based Solutions, Broadway Initiative Paper.

56 Dasgupta, P. (2021). The Economics of Biodiversity: The Dasgupta Review. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf [Accessed: 26/02/21].

57 Buijs, A.E., Mattijssen, T.J., Van der Jagt, A.P., Ambrose-Oji, B., Andersson, E., Elands, B.H., Steen Møller, M. (2016). Active citizenship for urban green infrastructure: fostering the diversity and dynamics of citizen contributions through mosaic governance. Current Opinion in Environmental Sustainability 22, 1–6. https://doi.org/10.1016/j.cosust.2017.01.002

58 Buijs, A. E., Elands, B.H.M., Havik, G., Ambrose-Oji, B., Gerőházi, E., Jagt, A. van der, Mattijssen, T.J.M., Møller, M.S., Vierikko, K. (2016). Innovative Governance of Urban Green Spaces: Learning from 18 innovative examples across Europe (No. ENV.2013.6.2-5-603567; 2013-2017). University of Copenhagen.

59 The Land Trust (2020). Case study: Wellesley Woodlands. [online] Available at: https://thelandtrust.org.uk/wp-content/uploads/2015/09/Wellesley-Woodlands.pdf [Accessed: 19/11/2020].

60 UK Green Building Council (2021). Framework for Defining Social Value: A framework for defining and delivering social value on built environment projects. [online] Available at: https://www.ukgbc.org/wp-content/uploads/2021/02/Framework-for-Defining-Social-Value.pdf [Accessed: 18/03/21].

UK Green Building Council

The Building Centre
26 Store Street
London WC1E 7BT

T 020 7580 0623
E info@ukgbc.org
W ukgbc.org