# THE VALUE OF URBAN NATURE-BASED SOLUTIONS

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Resilience and nature-based solutions Programme Partners

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# Contents

# Foreword

In March 2022, the United Nations Environment Assembly adopted an official definition of nature-based solutions (NBS), putting them centre stage in an international context and recognising the crucial role they must play in the global response to climate change and its social, economic, and environmental effects.

Highlighted in the IPCC's recent report on adaptation, impacts and vulnerability, our cities are increasingly under threat and the need to adapt to climate related impacts is becoming more urgent. The importance and financing of nature also played a pivotal role in COP26 discussions, advancing this global shift towards nature protection and improving understanding of its role in adaptation action.

Positively, NBS offer an adaptation approach for our cities and built environments to become more resilient to the impacts of climate change. At the same time, multiple secondary benefits can be realised, such as increasing health and wellbeing, reducing energy costs, and increasing the number and quality of biodiverse habitats.

This report raises awareness of the importance and immense opportunities NBS can offer in an urban context. It offers guidance in a nascent field and encourages developers, asset owners and design teams to acknowledge and assess the true value of NBS within developments.

This is an important step to mainstreaming the integration of NBS in urban developments and provides some simple tools to anchor NBS at the core of projects. From raising awareness on the multiple benefits of NBS to developing innovative finance models, this guidance encourages decision makers to explore and implement the process of NBS integration.

We hope that this report inspires a wider uptake of NBS in the industry and helps to bridge the gap between finance and meaningful, holistic adaptation using nature-based solutions.

**Eoin Murray**
Head of Investment
Federated Hermes

# 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]

Biophilic design: A design philosophy that encourages the use of natural systems and processes in the design of the built environment.[3]

Blue infrastructure (BI): Naturally occurring or created water bodies incorporated into urban design in conjunction with SuDS features. When in combination with green infrastructure referred to as blue-green infrastructure.[4]

Built environment: The environment encompassing all forms of building (housing, industrial, commercial, hospitals, schools, etc.), and civil engineering infrastructure, both above and below ground and includes the managed landscapes between and around buildings.[5]

Carbon sequestration: The long-term storage of carbon in plants, soils, geologic formations, and the ocean.[6]

Carbon sinks: Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere. Forests and other vegetation are considered sinks because they remove carbon dioxide through photosynthesis.[7]

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.[8]

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.[9]

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.[10] 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.[11]

Environmental, social and governance (ESG): Factors 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. Broadly, ESG policies or practices are representative of corporate sustainability and organisational approaches to risk management.[12]

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.[13]

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.[14]

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.[15]

Nature-positive: An approach to halt and reverse biodiversity loss by 2030 with the goal of a full recovery of the biosphere by 2050.[16]

Sustainable Urban Drainage Systems (SuDS): Any system utilising natural resources in place of grey infrastructure for water drainage and management.[17]

Value: Return on investment for society, the economy and the environment, in monetary terms as well as positive outcomes of immaterial nature. Within this publication, we adopt the capitals approach to value and ecosystem services and the primary benefits we identified as ways to deliver value.[18]

# Executive summary

When designing and delivering urban NBS, conversations are too often focused around narrow and rigid framings of value, driven by assessments of financial return on investment. Compared with more traditional design and development practices, NBS can deliver multiple benefits simultaneously. However, these benefits are often complex, may not easily generate a direct financial value, and can be distributed over a large and diverse range of stakeholders, requiring a wider assessment of benefits and value.

This report outlines an approach to successfully integrate nature-based solutions into the built environment. It includes a suggested framework and a range of innovative mechanisms and examples to increasingly make the case for and assess the value of NBS by presenting a simple benefits analysis approach that can be utilised by stakeholders independently to identify where value is created and to develop bespoke financing strategies for NBS. This is based on 12 benefits and 5 types of NBS, but equally applies to other NBS not listed in this report.

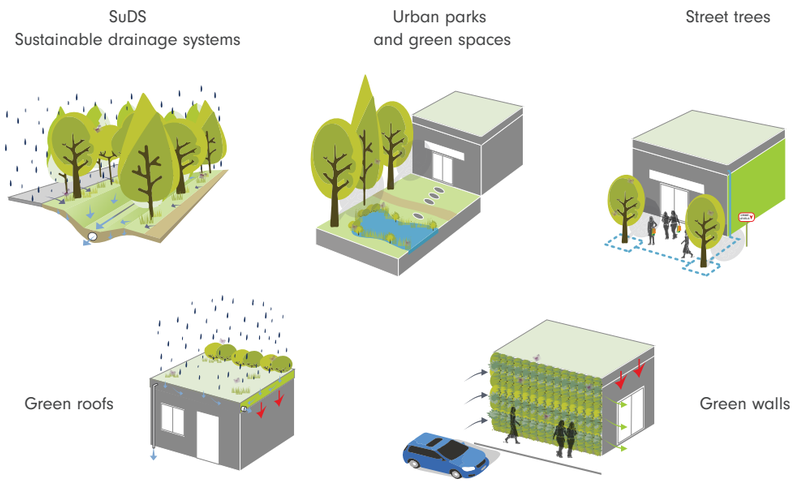
The proposed value framework for NBS outlines the necessary steps to recognise and capture the true value of NBS.

Some key findings include:

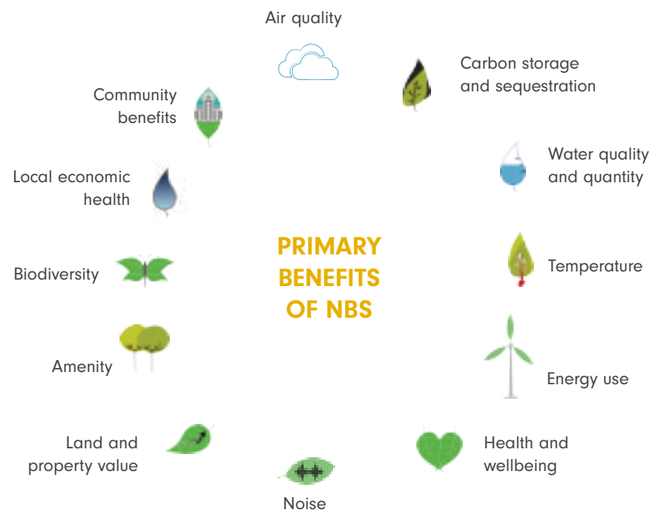
- **Nature-based solutions are an exceptional solution for the challenges of our time**, namely the climate and biodiversity crises. By integrating NBS into new projects and refurbishment proposals, stakeholders can futureproof developments and provide much needed adaptation to climate-related risks, whilst also delivering benefits for nature.
- **Nature-based solutions provide multiple benefits.** When compared to conventional grey infrastructures, NBS provide a multitude of economic, social and ecological benefits in addition to their core purpose. At the moment, many of these benefits and their value remain unaccounted for. Incorporating these in the project brief from the outset will result in an overall increase of value created.
- **Nature-based solutions affect a wide range of stakeholders.** By gaining greater clarity on who benefits and how, NBS can be used to harness support from a variety of stakeholders and innovative finance mechanisms can emerge.
- **Identifying where NBS add value can lead to additional financing opportunities.** The current market approach, in which positive externalities are not embedded in overall value, can result in private markets performing below their capacity. When NBS are omitted due to the monetary cost of implementation, this fails to recognise the wider value that they can deliver. Instead, by internalising these values (or positive externalities), this can more accurately represent the wider value of NBS. This helps the case for NBS, leading them to delivering a wide range of benefits as well as providing return to investors.



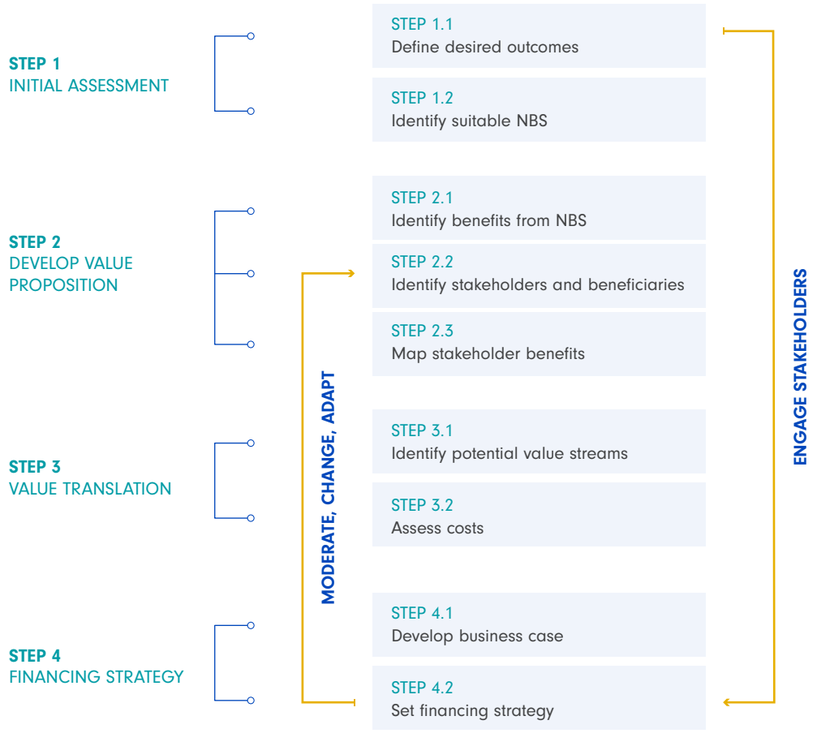
## Urban NBS typologies considered within this report




## Primary benefits of NBS



## Value framework for nature-based solutions




A central recommendation is to undertake a stakeholder-benefits mapping. After identifying the benefits that the chosen NBS provide, an assessment is made on who the stakeholders are and in what way they benefit from the NBS, stacking benefits of a range of stakeholders for a holistic appraisal of the value of NBS. The table below has been developed as a useful tool to guide this process.



STAKEHOLDERS

| BENEFITS AND IMPACTS | Nature | Public bodies | | | NGOs | Private actors | | | | | | | | Communities and citizens | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Local government | National government | Health authorities | | Business owners | Employees | Developers | Asset owners | Asset operators | Land owners | Utilities providers | Transport providers | Insurers | Residents/occupants | Communities | Visitors/Tourists |
| Air quality | | | | | | | | | | | | | | | | | |
| Carbon storage and sequestration | | | | | | | | | | | | | | | | | |
| Water quality and quantity | | | | | | | | | | | | | | | | | |
| Temperature | | | | | | | | | | | | | | | | | |
| Energy use | | | | | | | | | | | | | | | | | |
| Health and wellbeing | | | | | | | | | | | | | | | | | |
| Noise | | | | | | | | | | | | | | | | | |
| Land and property value | | | | | | | | | | | | | | | | | |
| Amenity | | | | | | | | | | | | | | | | | |
| Biodiversity | | | | | | | | | | | | | | | | | |
| Local economic health | | | | | | | | | | | | | | | | | |
| Community benefits | | | | | | | | | | | | | | | | | |

# Introduction

## The need for adaptation

In a year of records, flooding events displaced thousands of people, wildfires destroyed forests and consumed towns, whilst temperatures surged around the world as we experienced our seventh consecutive hottest year on record.[19] 2021 demonstrated that there are fewer and fewer places to hide from the accelerating impacts of climate change, echoing the critical need for greater levels of adaptation.

In February this year, the IPCC published their report on impacts, adaptation and vulnerability which again reinforced the urgent need for adaptation, highlighting that "any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future."[20]

For Europe, this report identifies the following four key risks:

- Mortality and morbidity of people and changes in ecosystems due to heat.
- Heat and drought stress on crops.
- Water scarcity.
- Flooding and sea level rise.

Many of these risks fall under the direct responsibility of the built environment such as heat stress and flooding. Even if global heating is limited to 1.5 degrees, all risks range between moderate and high levels. This shows once more that rapid action on adaptation and mitigation must be pursued with equal action and urgency. To date, the gap between action and what is needed to address climate risks continues to widen.



Figure 1:

## Key risks for Europe under low to medium adaptation[21]


* The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

In addition, we are also facing a crisis of ecosystem degradation and biodiversity loss. Around the world, habitats are in decline and a sixth mass extinction is underway.[22] According to the Biodiversity Intactness Index, the UK has already lost 47% of its biodiversity, placing it amongst the worst 10%, globally.

**Nature-based solutions (NBS)** can be an effective way to tackle both the climate and ecological crises simultaneously. NBS offer a means of adapting to the impacts of climate change, whilst protecting and enhancing biodiversity, and acting as carbon sinks in some circumstances. This has been demonstrated in various projects around and the world, both in rural as well as urban settings.

**DEFINITIONS OF NBS**

NBS EU: "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."

IUCN: "Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits."

Encouragingly, for the first time, nature held an important place in climate discussions during UNFCCC COP26, placing the interconnectedness of climate and ecological crises centre stage. While a breadth of ambitious pledges for nature emerged from the discussions, the international and local finance required to deliver adaptation lags behind funds for climate change mitigation, and this finance gap is growing.[23]

## The cost of inaction

The need for adaptation is pressing. Late adaptation action may save costs in the short term but will leave assets exposed to the unabated risk of climate change, and that risk is only going to increase in the future. Conversely, early adaptation interventions significantly decrease the exposure to risks from climate change and therefore are likely to reduce overall costs in the medium to long term. As such, NBS are well-placed to contribute significant benefits, responding the climate and ecological crises, while delivering economic benefits and contributing to closing the adaptation gap.

This is supported by the findings of the Climate Change Committee's (CCC) Third Independent Assessment of UK Climate Risk (CCRA3) of 2021. The report stressed how the gap between the level of risk we face and the level of adaptation underway has widened since the last assessment in 2017. Crucially, the CCRA3 recognises that swift action to adapt to the physical impacts of climate change will be much cheaper in the long term than inaction against these risks.[24]

Large scale, early delivery of adaptation using nature-based solutions is therefore an economically wise decision and is being increasingly recognised by the private sector. Mandatory disclosure of climate-related risks came into force from April 2022 for large organisations and financial institutions within the United Kingdom, aligned with the Task Force on Climate-Related Financial Disclosures' (TCFD) recommendations. While transparent and accurate climate-related risk assessments and reporting lay the foundations, we need to close the gap between the level of risk we face and the level of climate adaptation.

## Financing adaptation

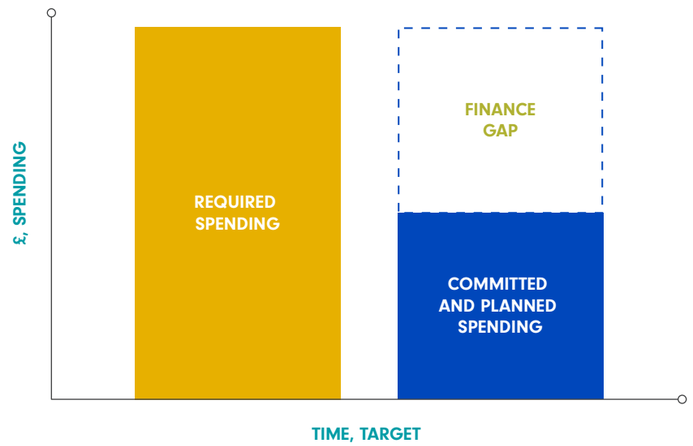
Delivering NBS at scale will require both public and private funds to be committed at increased levels. To date, the majority of global finance for nature has been provided by the public sector, coordinated by national and local governments. However, the private sector will need to more than double its contributions by 2030, if this growing finance gap is to be bridged.[25]

Figure 2 illustrates that gap within a UK context. Within the The Finance Gap for UK Nature report a £976 million spending **gap** has been identified for the UK for the provision of accessible green (and blue) spaces.

**DEFINITION OF FINANCE GAP**

Finance gap is the difference between required spending and committed/planned spending associated with the delivery of a set of nature-related outcomes, providing human well-being and biodiversity benefits.

**Figure 2:** Finance gap for nature




Source: GFI, eftec, & Rayment Consulting (2021)

The growth of the green finance sector and the increased consideration of environmental, social, and governance (ESG) factors in investment make nature-positive actions an increasingly attractive prospect for investors.[26] NBS are therefore increasingly well positioned as both a desirable and valuable asset and/or investment, providing their case can be made. However, several key challenges currently stifle the NBS business case:

- **Rigid framings of 'value'**. When the value of nature is considered in strict economic terms according to financial returns on investment, it is difficult to capture the full range of values provided. Within strict framings, the values created by NBS are directly financial, such as savings in energy use via green roof and wall installation. Or they are considered non-financial, such as health and wellbeing impacts and other more qualitative benefits. However, there are also indirect financial values generated by NBS, such as increases to business patronage via the presence of street trees, as well as other values that are not yet sufficiently evidenced. Because of this narrow understanding of value, NBS are often perceived as purely an additional cost.
- **Immature financial models**. Whilst an increasing number of innovative financial models have begun to develop potential revenue streams from NBS delivery, they require further application in practice. While proof of concept has been delivered on individual projects, we are lacking a wide uptake by the industry, and with it the confidence on the bankability of nature-based revenue streams and positive outcomes.
- **Lack of understanding and awareness**. Whilst the evidence base for NBS benefits has been growing rapidly over recent years, there are still gaps in understanding amongst key built environment stakeholders. This is particularly acute when considering the wider benefits that NBS provide and who receives them.

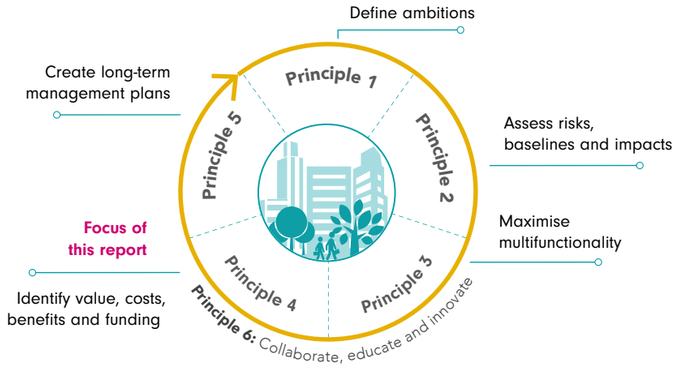
By addressing the above challenges, this report expands on The Principles of Delivering Urban Nature-based Solutions which was published in 2021 and sets out six principles to assist organisations and individuals in the design, delivery, and operation of urban NBS to deliver on UKGBC's sector ambition for 2030:

> "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."

Within this guidance, greater detail is given to principle 4 on identifying value, costs, benefits and funding.



**Figure 3:** Scope of this report in relation to Principle of Delivering Urban Nature-based Solutions.




## Purpose of the report

Despite these persistent challenges, there is growing recognition of the need for NBS to enhance the resilience of our ecosystems, built environments, and communities. However, if NBS are to move beyond being a 'nice-to-have' asset or design feature, their value, as well as who benefits from them, must be more holistically understood.

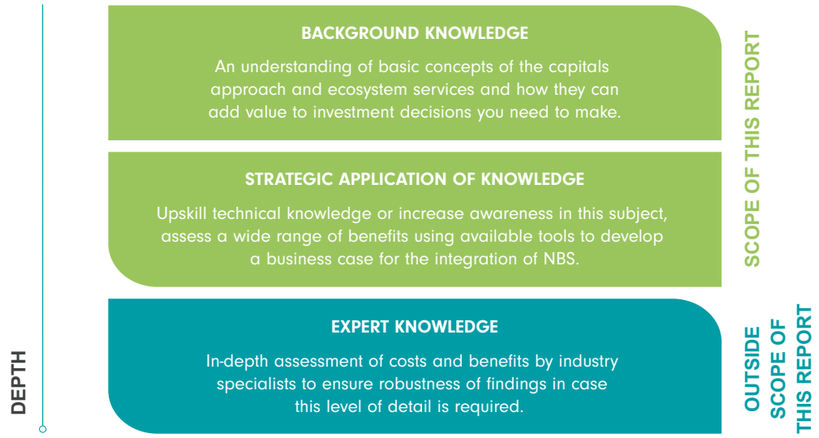
The links between stakeholders, benefits, and potential value flows must be defined more clearly if the financing and delivery of NBS are to be scaled-up effectively. This report articulates these links by mapping the benefits derived from NBS onto a set of built environment stakeholders and outlining opportunities where financial benefits can be drawn, or revenue streams developed.

The guidance will help users to define the benefits and value that they can draw from NBS, supporting them to develop their own business cases for investment, delivery, and maintenance of NBS, to further mainstream its consideration across industry.

In summary, this report aims to:

- Increase understanding of the benefits of NBS.
- Identify the diverse range of stakeholders who are beneficiaries of NBS.
- Provide guidance on navigating the existing tools to assess and quantify benefits of NBS.
- Develop a process for defining and maturing finance opportunities for NBS.
- Support the mainstreaming of NBS finance and delivery.
- Develop the evidence base on benefits and financing of NBS.

**Figure 4:** Scope of the report




## Target audience

This report is primarily intended to be used by decision makers in the built environment such as developers and asset owners. In addition, members of design teams can use this information to support the case for nature-based solutions on a project level. This includes sustainability consultants, ecologists, and landscape architects. It will also be useful to local authorities with an interest in adaptation strategies and green infrastructure. Finally, financial institutions such as investors and lenders will find this report useful.

## Methodology

Initial desk-based research, incorporating a literature review and semi-structured interviews, identified gaps in knowledge and helped identify the target audience and intended outcomes. With gaps identified, a Task Group was established, which then worked collaboratively through a series of workshops to consider how to overcome the gaps and to draft the content of this report.

A draft of this report was circulated among members of the task group and an external review group to ensure overall rigour and integrity of its findings. A full list of contributors can be found in the Appendix.

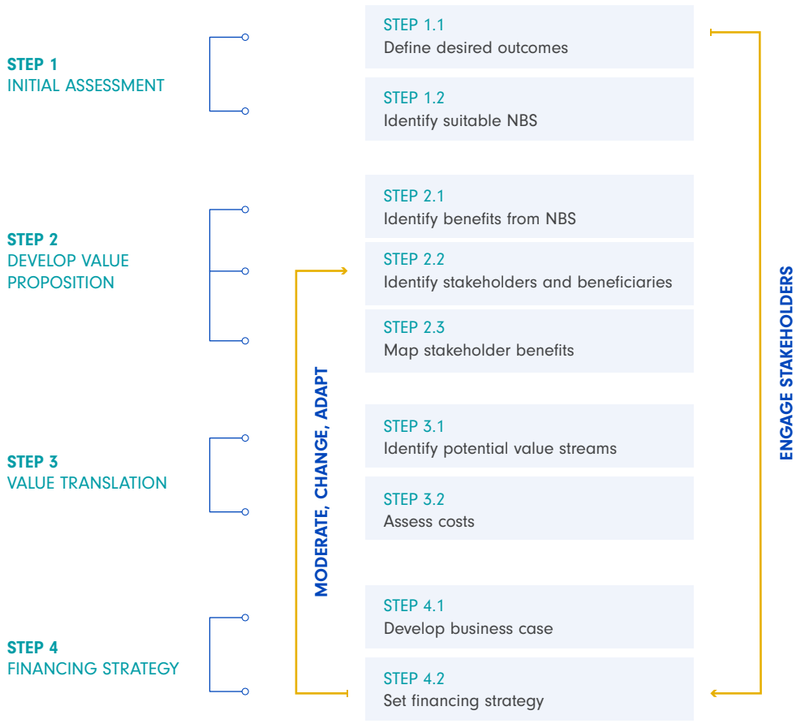


# Value framework for NBS

## Value framework for NBS

Incorporating the value of NBS into developments can be a complex task. To aid this task, UKGBC developed a value framework for NBS which acts as a guide that is easy to follow and aims to reduce complexity. Figure 5 shows an overview of this framework. Starting with an initial assessment of desired outcomes and suitable NBS based on project specific context, it takes the user through developing a value proposition by gaining a clear understanding of benefits and beneficiaries, and translating this into actual revenue streams where appropriate. This is followed by an overview of financing strategies based on several different scenarios. Engaging stakeholders throughout the process is key to its success.

**Figure 5:** Value Framework for NBS

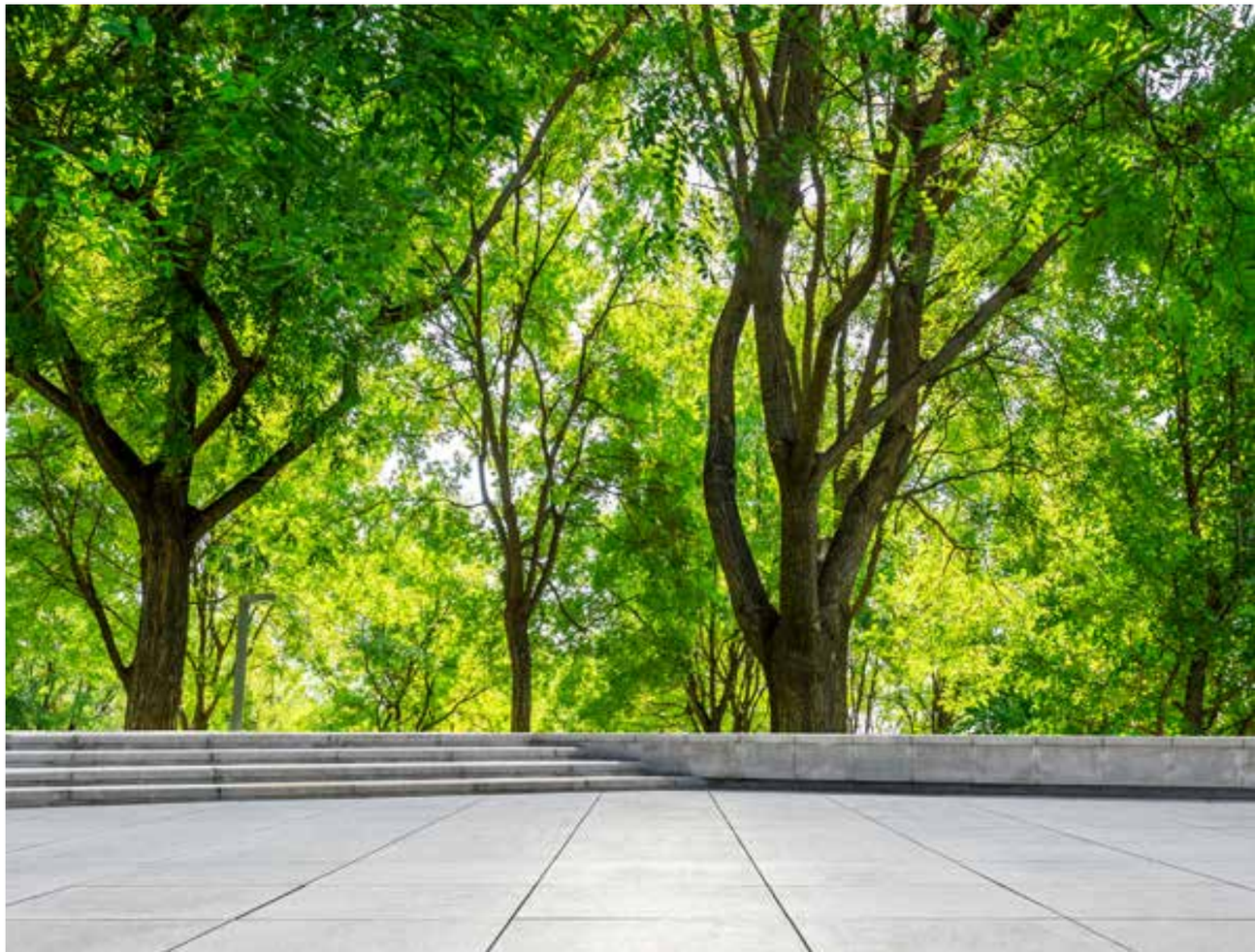





| THE FINANCING FRAMEWORK... | THE FINANCING FRAMEWORK DOES NOT... |
|---|---|
| Supports strategic-level planning for NBS delivery | Independently generate results or produce a business case |
| Enables context-specific and bespoke NBS finance models and business cases to be developed | Act as a tool to quantify benefits |
| Provides a standardised process to suit a diverse range of stakeholders | Provide a comprehensive guidance on economic valuation of nature and green infrastructure |

In the following chapters, the framework and its steps are explained in more detail alongside additional information on NBS, benefits and financing strategies.

Directions directly related to the steps of the framework are displayed in boxes to easily guide the reader through the framework and aid with wayfinding.



Step 1

# Define desired outcomes and identify suitable NBS

Commitments and actions to deliver benefits to wider society and positively contribute to the climate and ecological crises are fast becoming central features of corporate strategies across the built environment value chain. As momentum gathers, it is crucial that these stakeholders recognise the critical role that NBS play in supporting **holistic climate resilience**. Equally, an emerging mandate for development processes and/or business operations to be nature-positive is increasingly driving organisational change, as explained in Table 1 below.

**Table 1:** Drivers for NBS

| POLICY DRIVERS | ESG DRIVERS | VALUE CREATION |
|---|---|---|
| • Delivering minimum 10% Biodiversity Net Gain (see Figure 6) on new developments..<br>• Aligning with emerging Environmental Net Gain requirements as outlined in the Environment Bill (see Figure 6).<br>• Delivering London's Urban Greening Factor (UGF) targets for commercial and residential buildings.<br>• Meeting Task Force on Climate-related Financial Disclosures requirements on physical climate risk management and adaptation (mandatory as of April 2022*).<br>• Aligning with emerging Task Force on Nature-related Financial Disclosures recommendations. | • Reducing exposure of assets and operations to physical climate risks.<br>• Supporting ecosystem services that deliver environmental, social, and economic benefits.<br>• Protecting and/or enhancing corporate reputation, strengthening market position and CSR benefits.<br>• Meeting and/or exceeding corporate strategy commitments and KPIs. | • Going beyond business as usual to create lasting value for society.<br>• Receiving and delivering a wide range of primary and secondary benefits to a diverse range of stakeholders.<br>• Achieving certifications, such as WELL, BREEAM, and LEED. |

* See UKGBC report on Measuring and Reporting Physical Risks from Climate Change to Built Assets. Note that TCFD reporting is mandatory for the largest organisations and financial institutions as of April 2022.



VALUE FRAMEWORK DIRECTIONS

**Step 1.1**
As we propose a value-centric approach, the first step should be identifying the desired outcomes for the project based on the primary benefits NBS deliver. This will provide a foundation for more detailed assessments of feasibility and suitability in later steps.

Step 1 is most effective when carried out collaboratively with stakeholders and coordinated as part of an ongoing stakeholder engagement process (in line with Principle 6 of Principles for Delivering Urban Nature-based Solutions).

**Step 1.2**
Many NBS may be suitable to deliver the desired outcomes. However, several factors can act as opportunities or constraints within a given context. When identifying suitable NBS, consider:

| | |
|---|---|
| **Physical/ Spatial factors** | Suitable or available space on the site, i.e., the type of roof (i.e. pitched or flat) or the limits of the wider grounds for any landscaping (i.e. space for SuDS). |
| **Ownership** | I.e., who owns what, and the implications for NBS design, delivery, and long-term management and maintenance considerations. |
| **Government policy** | • National Planning Policy Framework, National Planning Policy Guidance.<br>• Design codes.<br>• 25 Year Environment Plan, Environment Bill, National Energy and Climate Plan. |
| **Local policy drivers/ Levers** | • Local Development Frameworks, Local Plans.<br>• GI strategies, Biodiversity Action Plans, Ecological Emergency Action Plans, Climate Action Plans.<br>• Neighbourhood Plans, community strategies. |

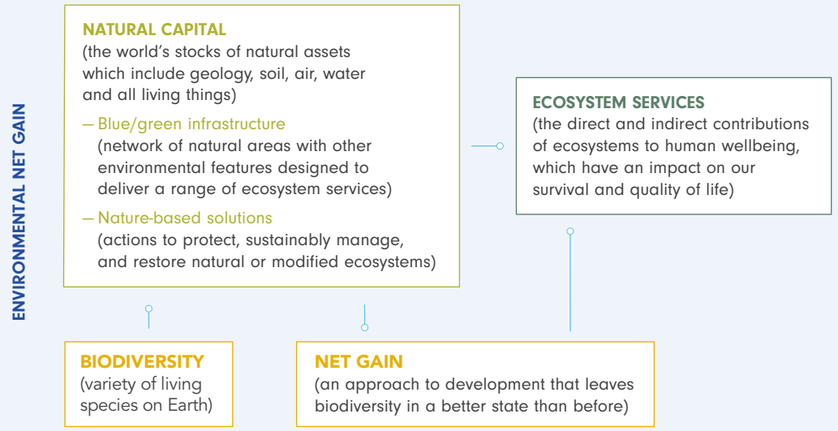
## Biodiversity and NBS

Whilst NBS are a novel concept, they also stand as the latest in a long line of nature-based design concepts and practices that seek to enhance the multifunctionality and sustainability of both built and natural environments. When considering function and value of such approaches, a number of core concepts have emerged, which are used in the development of policies and when referring to design and delivery. Figure 6 below provides some clarity on these key concepts and shows how they relate to one another and to key policy drivers.

**HOLISTIC CLIMATE RESILIENCE**

Holistic climate resilience here referring to the combination of social, environmental, and economic resilience.

**Figure 6:** Demystifying concepts and jargon




As developers become increasingly focused on the delivery of Biodiversity Net Gain (BNG) from their projects, they will seek to incorporate green infrastructure design principles and specific NBS on-site, where such interventions support BNG of 10% or more. If developers utilise NBS to deliver BNG, the requirement becomes a conduit for both biodiversity uplift and the delivery of a wider range of benefits. These wider benefits (referred to as ecosystem services) are component parts of Environmental Net Gain (ENG), which encompasses all of the core concepts outlined above (Figure 6).

There are, however, some important caveats to note when positioning policy requirements such as BNG as the key drivers for NBS delivery. BNG is primarily a habitat metric, therefore NBS do not automatically deliver BNG under all circumstances. In a project, site constraints may limit the capacity of NBS to deliver adequate BNG. Whilst following good design principles enhances the capacity of interventions to deliver BNG, this may not always be possible on-site.

At present, BNG requirements apply solely to new build projects, yet the majority of built assets existing today will still stand in 2050.[27] We therefore recommend that stakeholders seek to go beyond compliance by prioritising NBS within retrofit contexts (as well as new developments) to deliver wider ENGs that support climate resilience.

However, without mandatory requirements for ENG or delivering BNG on retrofits, other drivers are still required to position NBS at the heart of project decision-making (Table 1). Understanding the extensive benefits NBS provide in greater detail presents a critical first step in embedding them more deeply within practice.



## Primary benefits of NBS

This report considers five urban NBS typologies (Figure 7) as well as the 12 primary benefits they deliver, in line with UKGBC's Principles for Delivering Urban Nature-based Solutions report (see Figure 8 and Table 2).

**Figure 7:** Urban NBS typologies considered within this report

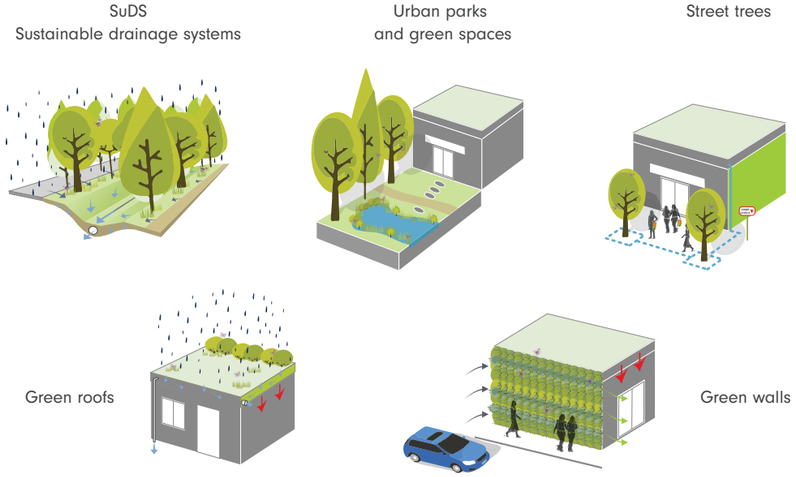
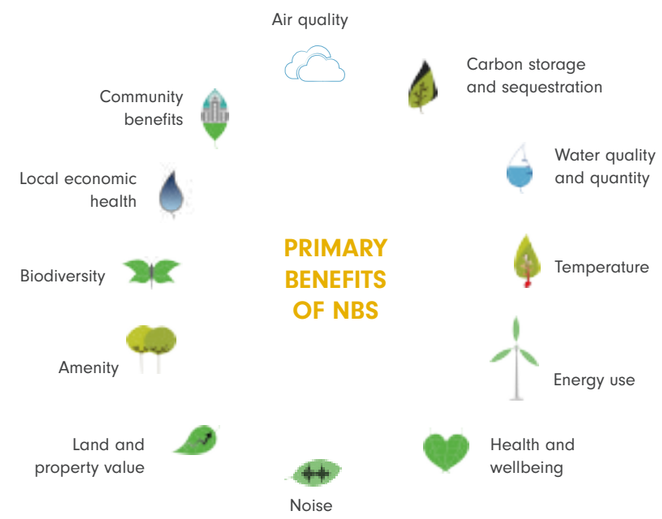



**Figure 8:** Primary benefits of NBS



## Framing the benefits conceptually

There are several established concepts that incorporate and articulate the positive benefits that NBS provide. When quantifying or attempting to monetise these benefits, the most common conceptual framings utilise 'natural capital' or '**ecosystem services**' approaches. In some circumstances, natural capital accounts for a region or a site will underpin an ecosystem service assessment. This can help stakeholders first understand what is there (i.e., what natural assets), and then second, how these natural assets or features function (i.e., what services or benefits they provide).

Another way of framing the benefits is using the capitals approach, as proposed by the Value Definition Framework. In addition to natural capital, this framework identifies a total of four different capitals, namely natural, social, human and produced capital.

The 12 benefits that form the core of this report are an easy to understand and user-friendly way of capturing both the capitals approach as well as ecosystem services. Figure 9 shows how these different concepts interrelate.

### WHAT ARE ECOSYSTEM SERVICES?

The benefits that natural assets and processes provide to humankind. These can be the products provided to people by nature or nature's ability to regulate the climate, support ecosystems, or provide cultural benefits.

**Provisioning**: Products obtained from ecosystems (food, raw materials, energy, other goods).

**Regulating**: Benefits obtained from the regulation of ecosystem processes (purification of air/water, microclimate regulation, pollination, flood control).

**Supporting**: Services necessary to provide all other ecosystem services (integrity and health of the ecosystem, nutrient cycling, soil formation).

**Cultural**: Non-material benefits people obtain from ecosystem services (recreation, health and wellbeing, identity).

**Table 2:** Defining the primary benefits of NBS

| | |
|---|---|
| **Air Quality** | NBS can improve air quality by trapping fine particles and filtering pollutants such as sulphur dioxide and nitrogen dioxide. |
| **Carbon Storage and Sequestration** | Comprised of organic material, NBS sequester carbon in varying amounts depending on the type of NBS and scale of species used in design. |
| **Water Quantity and Quality** | Water quantity: NBS can retain or slow the flow of rain and surface water, reducing strains on municipal drainage systems and enhancing flood resilience.<br>Water quality: Maintaining and increasing the quality of water by filtering or providing necessary biochemical processes to enhance water quality. |
| **Temperature** | NBS can attenuate temperatures via shading and evaporative cooling, contributing to a pleasant microclimate and combatting Urban Heat Island effect. |



| | |
|---|---|
| **Energy Use** | NBS can act as an additional layer of insulation, particularly on roofs and walls, lowering energy demand in directly adjacent spaces. |
| **Health and Wellbeing** | Interaction with or exposure to nature provides a wide range of mental and physical health benefits, such as stress reduction. |
| **Noise** | NBS absorb more noise compared to grey infrastructural surfaces, providing audible protection for people and wildlife. |
| **Land and Property Value** | Biophilic buildings are already under high demand and are expected to increase. Buildings are expected to sell for higher prices, and retain value better, than assets which do not feature NBS or are not within close proximity to nature. |
| **Amenity** | Access to recreation and leisure space, as well as nature support good health and wellbeing and contribute to a sense of place amongst communities. |
| **Biodiversity** | NBS enhance biodiversity by providing habitats for flora and fauna. |
| **Local Economic Health** | NBS can increase footfall and patronage for businesses and attract people to visit economic centres. |
| **Community Benefits** | NBS, such as parks and greenspaces, can act as hubs for communities to interact and can support initiatives like community gardening and farming. |

See the IGNITION report on benefits for business and society as well as the IGNITION evidence base for further detail.

**Figure 9:** Benefits, ecosystem services and the capitals approach

Different nature-based solutions have a range of impacts per benefit and can vary significantly on what they deliver. While street trees might attract additional customers for the benefit of local businesses, a green roof will most likely not have the same effect. Table 3 collates extensive quantitative and qualitative data from both the IGNITION and Urban GreenUP projects to conceptualise an overview of individual benefit provision per NBS typology.

CASE STUDY

### Spains Hall Estate, Natural capital account to inform a shift from a "food first" to a "nature first" business mode

Challenge: To demonstrate how to quantify the ecosystem services benefits of land management changes including agroforestry, natural flood management and beaver release on a rural estate, and estimate their value for sale on future environmental markets.

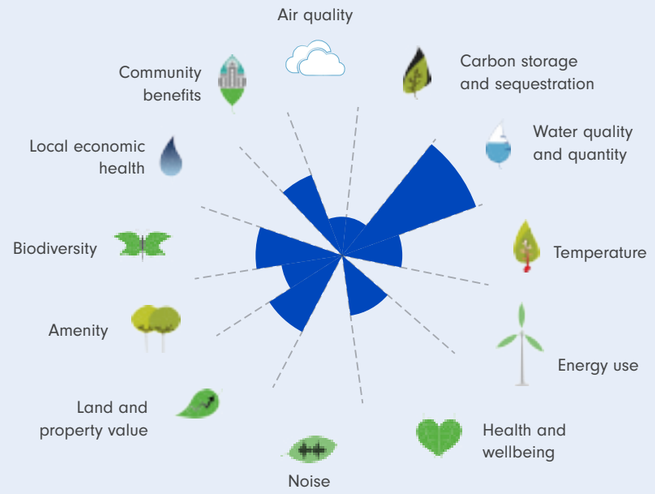
This was done through Natural Capital Accounting facilitated by Atkins' Natural Capital Studio tool, integrating Natural England's Biodiversity Metric and Woodland Carbon Code, to make a 'before and after' comparison on the 850 ha site. A two-step approach was undertaken, first a high-level estimation using national datasets, and second using site-specific data. A valuation of ecosystem services was calculated, including biodiversity credits, carbon credits, flood protection, water quality, human health gains, and recreation and tourism income.

This demonstrated the 'art of the possible' for how natural capital accounting can support a business case for converting the estate to a 'nature first' business model. High-level assessment demonstrated an approach to delivering rapid insights for strategic decision making and informing designs to maximise ecosystem services value, with the second step demonstrating enhanced granularity and accuracy when data is available. Evidence informed a successful application for the estate to take part in Natural England's biodiversity net gain (BNG) credit trial.



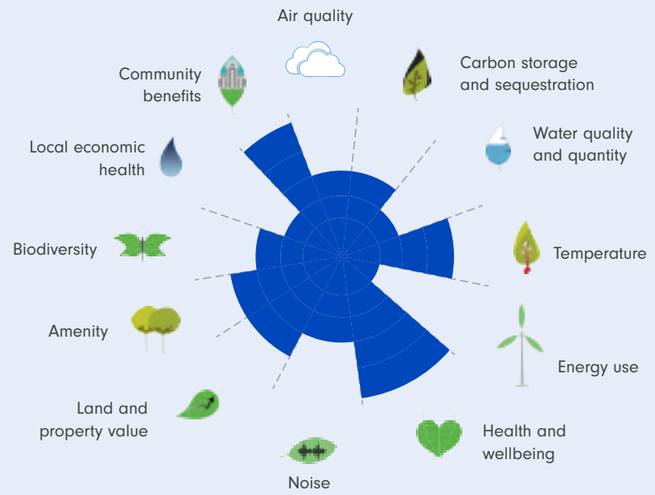
Table 3:

## Primary benefits of NBS by typology



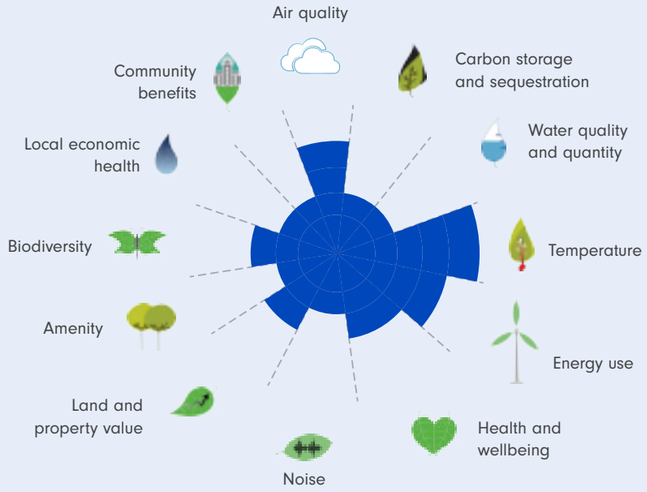

### SuDs

- Stormwater attenuation via canopy and soil.
- Flood risk mitigation can stabilise and increase local land and property value.



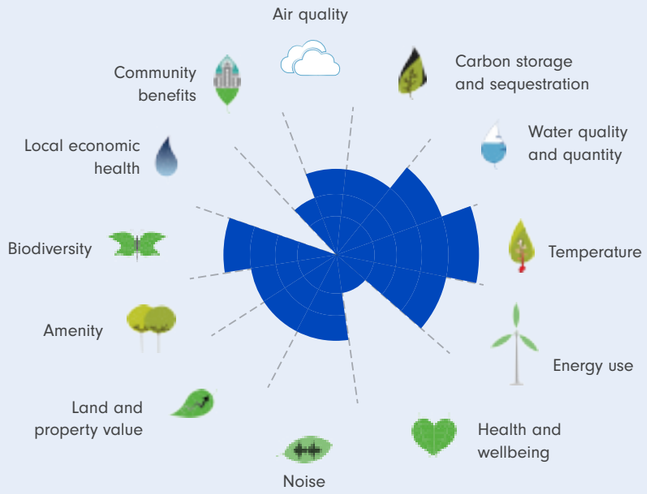

### Urban parks and green spaces

- Providing recreation space.
- Value increase of properties in the vicinity.
- Counteracting the Urban Heat Island Effect, helping to naturally prevent urban space from overheating.




## Green walls

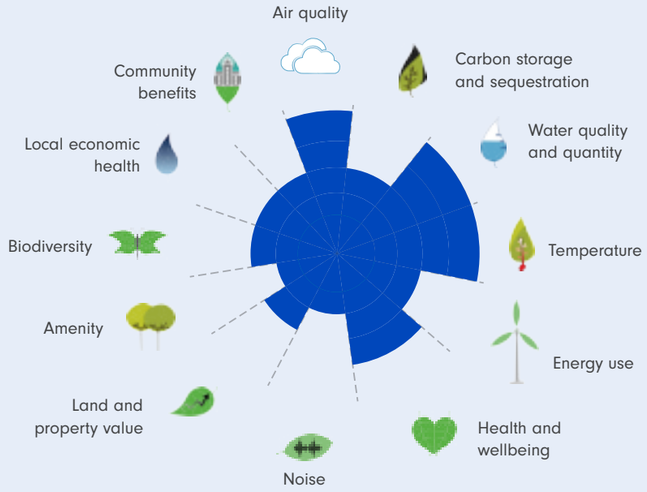
- Noise attenuation from traffic.
- Reduction of fine particles and NOx in the street canyon.
- Insulating benefits to the adjacent indoor space.
- Aesthetic value and health and wellbeing benefits.




## Green roofs

- Recreation space if accessible.
- Providing habitat and pollination.
- Urban water management.
- Increasing efficiency of rooftop photovoltaics by keeping panels cool.
- Positive effects compound with widespread adoption of green roofs on urban scale.






## Street trees

- Trees are a natural drainage feature thanks to canopy interception, water drawn from the soil and additional infiltration encouraged by the roots.
- Can be SuDS enabled to increase effectiveness of stormwater attenuation.
- Air pollution mitigation, able to reduce fine particles up to 50% and NO2 up to 35%.
- Increased restaurant patronage and willingness to pay for goods and services on streets with trees.
- Contribute to health and wellbeing of local residents.
- Counteracting the Urban Heat Island Effect, helping to naturally prevent urban space from overheating.

We recommend the IGNITION report on benefits for business and society as well as the IGNITION evidence base for further detail. Find the methodology behind assessing the benefits impact in the Appendix.

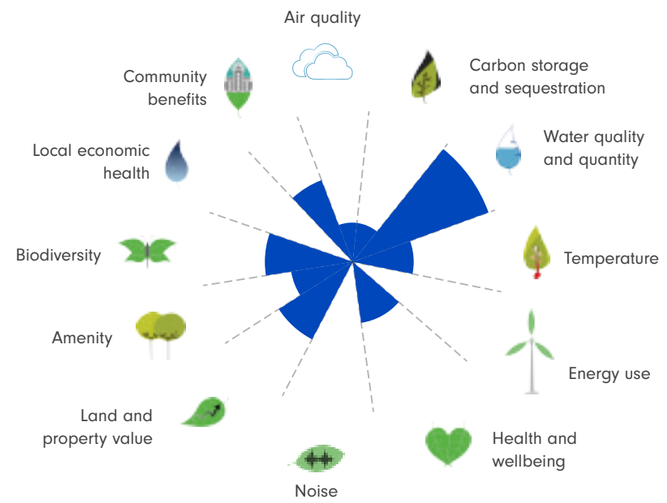
## Grey vs Green Infrastructure

Latest research has shown that NBS can be up to 50% more cost effective than traditional 'grey' infrastructure to provide the same infrastructure service. The same research also found that NBS provide 28% better value for money than grey infrastructure.[28]

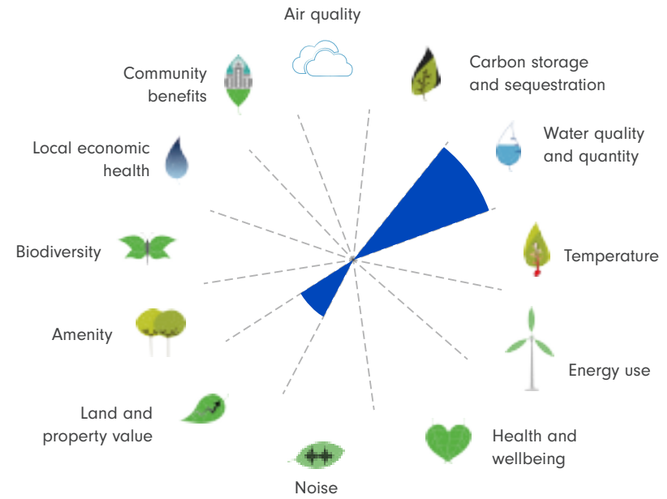
The performance of a green roof or any NBS will depend upon its design, geographic location, surroundings, and the building itself. However, building on the extensive data underpinning the graphics in Table 3, we can demonstrate the disparities in generic functionality between green SuDS and conventional drainage infrastructures (Figure 10).



**Figure 10:** Multifunctional NBS vs monofunctional grey infrastructure




**Green SuDS**




**Conventional Drainage System**

Comparisons between the performance of green roofs and traditional roof types has demonstrated that the former not only improve the stormwater management of a building and its capacity to regulate heat, but also provide economic benefits.

A study of 2000sq metres of conventional and green roof found that over an estimated lifespan of 40 years a green roof would save about $200,000, of which, nearly two–thirds would come from reduced energy costs.[29]



Step 2

# Developing a value proposition

When designing and/or delivering urban NBS, conversations are too often focused around narrow and rigid framings of value, driven by assessments of financial return on investment. A wider assessment of benefits and value is required, that takes a more holistic approach and recognises there are a multitude of beneficiaries from well-designed, delivered, and managed NBS. Adopting this approach should deliver wider societal benefits, support an organisation's ESG reporting, and provide direct operational and reputational benefits.

To date, efforts to mainstream and upscale NBS delivery have primarily focused on value creation, value capture (measurement), and value translation (from qualitative to quantitative or financial) as the key elements that will catalyse greater investment in nature. **A range of collaborative, multi-national, and cross-sectoral research projects** have developed innovative valuation tools, finance models, and governance models that are supported by a wealth of stakeholder-specific guidance outlining how to utilise or engage with these resources and tools. However, tools and models are often acutely context-specific, which hinders their universal application.

This guidance attempts to overcome this barrier by presenting a simple benefits analysis approach, based on multiple frameworks, that can be utilised by stakeholders independently to identify where value is created and to develop bespoke financing strategies for NBS. The Value Framework for NBS can be utilised by stakeholders across the built environment value chain to establish a finance model and business case for NBS. It offers a strategic outline, which aims to be dynamic enough to be transferable across contexts, whether between different stakeholder groups (private or public sector) or governance systems (across local authority or national administrative boundaries).

IGNITION, Connecting Nature, Grow Green, Naturvation, Urban GreenUP, CleverCities.

### Step 2.1
### Identifying the benefits from NBS

Once suitable NBS have been decided upon (Step 1.2), stakeholders can consider the benefits they will deliver. Start by identifying the overarching primary benefits. Stakeholders can use the information in Tables 2 and 3 (above) as a starting point, but need to go further than this.

When considered in relation to a specific project, stakeholders can begin translating the generic primary benefits into more context-specific secondary benefits. The precise translation from primary to secondary benefit is dependent upon the recipient (see Step 2.3). Table 4 outlines an initial scoping of primary and secondary benefits for air quality, a full list can be found in the Appendix.

**Table 4:** Primary benefits, secondary benefits, and beneficiaries

| PRIMARY BENEFIT | RECIPIENT | SECONDARY BENEFITS |
|---|---|---|
| **Air quality** | Local Government | • Improvements to health (of citizens).<br>• Reduced hospitalisations/deaths.<br>• Alignment with local/national targets (i.e., Air Quality Action Plans). |
| | National Government | • Improvements to health (of population).<br>• Reduced hospitalisations/deaths.<br>• Alignment with local/national targets (i.e., Air Quality Action Plans). |
| | Health authorities | • Improvements to health (of population).<br>• Reduced hospitalisations/deaths operating cost savings |
| | Residents/ Occupants | • Improvements to health.<br>• Improved quality of life.<br>• Reduced hospitalisations/deaths. |
| | Visitors/ Tourists | • Improvements to health (i.e., reduced risk to health in a visit).<br>• Improved quality of life (i.e., a nicer experience). |
| | Business owners | • Improvements to health (of employees, i.e., fewer absences). |
| | Employees | • Improvements to health (i.e., fewer absences). |
| | Insurers | • Improvements to health (i.e., fewer claims/payouts). |

(See Appendices for full list of primary and secondary benefits and a list of recipients)





### Step 2.2
### Identify stakeholders and beneficiaries

With NBS determined and benefits in mind, the next step is to outline all stakeholders, including both those engaged in the process and any potential recipients of benefits delivered.

This list of stakeholders will vary depending on the desired outcomes of the project, the scale of the intervention, the location, the NBS typology or typologies to be delivered, their design and ultimate accessibility.

Aim to be as detailed as possible at this stage, as the stakeholders and the benefits they receive underpins the entire value proposition, the value translation (Step 4) and value capture stages (Step 5). Again, Table 4 provides a useful example of this process.

### Step 2.3
### Mapping the benefits and stakeholders

When most effective, NBS are designed to be multifunctional, delivering multiple benefits simultaneously. These benefits are diverse, and can be distributed over a wide range of stakeholders, depending on the context of the development.

Where a primary benefit is delivered, for example air quality improvement, the exact nature of the benefit will manifest itself differently, depending on the stakeholder (or recipient). These secondary benefits are more nuanced, for example air quality improvement provides health benefits to communities, its cumulative impact reduces the number of air quality-related hospitalisations and deaths, which simultaneously benefits health authorities and local and national governments. Ultimately, it is from these more specific secondary benefits that value can be created, captured, and possibly translated into financial terms.

Once you have established who the stakeholders are, what benefits will be delivered via NBS, you can start mapping them onto each other. Table 5 provides a generalised example drawn from secondary data sources, which presents the 12 primary benefits defined above (Table 2) and a range of secondary benefits, mapping them against a generic range of development stakeholders. Cells are highlighted wherever a benefit from any NBS can be attributed to a stakeholder.

In practice, Step 2.1 will more likely be carried out in conjunction with Step 2.2, though they are presented in a prescriptive format here to assist readers/users.

**Table 5:** Example stakeholder-benefits mappin

STAKEHOLDERS

| BENEFITS AND IMPACTS | Nature | Public bodies: Local government | Public bodies: National government | Public bodies: Health authorities | NGOs | Private actors: Business owners | Private actors: Employees | Private actors: Developers | Private actors: Asset owners | Private actors: Asset operators | Private actors: Land owners | Private actors: Utilities providers | Private actors: Transport providers | Private actors: Insurers | Communities and citizens: Residents/occupants | Communities and citizens: Communities | Communities and citizens: Visitors/Tourists |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Air quality** | | | | | | | | | | | | | | | | | |
| Improvements to health | | ■ | ■ | | | ■ | ■ | | | | | | | ■ | ■ | ■ | ■ |
| Improved quality of life | | | | | | | ■ | | | | | | | | ■ | ■ | ■ |
| Reduced hospitalisations/deaths | | ■ | ■ | | | | | | | | | | | | ■ | ■ | ■ |
| Alignment with local/national targets | | ■ | ■ | | | | | ■ | | | | | | | | | |
| **Carbon storage and sequestration** | | | | | | | | | | | | | | | | | |
| Increased offsetting opportunities | | ■ | ■ | | | | | ■ | | | ■ | | | | | | |
| Enhanced CO2 removal | ■ | ■ | ■ | | | | | | | | | | | | | | |
| **Water quality and quantity** | | | | | | | | | | | | | | | | | |
| Increased flood resilience | | ■ | ■ | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| Preferential insurance premiums | | | | | | ■ | | | ■ | | | | | | | | |
| Lower risk of damage to asset(s) | | ■ | ■ | | | ■ | | | ■ | ■ | | ■ | | ■ | ■ | ■ | |
| Lower risk of disruption to business | | ■ | ■ | | | ■ | ■ | ■ | | | | | ■ | ■ | ■ | ■ | |
| Lower risk of disruption to civic infrastructure | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | |
| Lower sewer overflows | | ■ | ■ | | | | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| **Temperature** | | | | | | | | | | | | | | | | | |
| Reduced hospitalisations/deaths | | ■ | ■ | ■ | | ■ | ■ | | | | | | | ■ | ■ | ■ | ■ |
| Productivity | | | | | | ■ | ■ | | | | | | | | | | |
| Improved comfort/reduced stress | | | | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| **Energy use** | | | | | | | | | | | | | | | | | |
| Lower operating costs | | | | | | ■ | | | ■ | ■ | | | | | | | |
| Alignment with local/national targets | | ■ | ■ | | | | | ■ | | | | | | | | | |
| **Health and wellbeing** | | | | | | | | | | | | | | | | | |
| Improved physical and mental health | | ■ | ■ | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| Improved quality of life | | | | | | | ■ | | | | | | | | | | |
| Increased productivity | | | | | | ■ | ■ | | | | | | | | | | |
| Increased worker retention | | | | | | ■ | | | | | | | | | | | |
| Enhanced attractiveness of place | | ■ | | | | ■ | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ |



STAKEHOLDERS

| BENEFITS AND IMPACTS | Nature | Public bodies: Local government | Public bodies: National government | Public bodies: Health authorities | NGOs | Private actors: Business owners | Private actors: Employees | Private actors: Developers | Private actors: Asset owners | Private actors: Asset operators | Private actors: Land owners | Private actors: Utilities providers | Private actors: Transport providers | Private actors: Insurers | Communities and citizens: Residents/occupants | Communities and citizens: Communities | Communities and citizens: Visitors/Tourists |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Noise** | | | | | | | | | | | | | | | | | |
| Lower stress levels | | | | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| Wildlife benefits | ■ | ■ | ■ | | | | | | | | | | | | | ■ | ■ |
| **Land and property value** | | | | | | | | | | | | | | | | | |
| Increased land value | | ■ | | | | | | ■ | ■ | | ■ | | | | | | |
| Increased property value | | ■ | | | | | | ■ | ■ | | ■ | | | | | | |
| Enhanced value retention | | ■ | | | | | | ■ | ■ | | ■ | | | | | | |
| Enhanced taxation value | | ■ | | | | | | | | | | | | | | | |
| **Amenity** | | | | | | | | | | | | | | | | | |
| Improved quality of life | | ■ | | ■ | | | ■ | | | | | | | | ■ | ■ | ■ |
| Improved physical and mental health | | ■ | | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| Enhanced attractiveness of place | | ■ | | | | ■ | | ■ | ■ | | ■ | | | | ■ | ■ | ■ |
| Enhanced community resilience | | ■ | | | | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ | |
| Enhanced employee satisfaction/ productivity/retention | | | | | | ■ | ■ | | | | | | | | | | |
| **Biodiversity** | | | | | | | | | | | | | | | | | |
| Improved ecosystem health | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | | | ■ | ■ | |
| Increased habitat provision | ■ | ■ | ■ | | | | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ |
| Alignment with local/national targets | | ■ | ■ | | | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Enhanced attractiveness of place | | ■ | | | | ■ | | ■ | ■ | | ■ | | | | ■ | ■ | ■ |
| Increased educational opportunities | | ■ | ■ | | | | ■ | | | | | | | | ■ | ■ | ■ |
| **Local economy health** | | | | | | | | | | | | | | | | | |
| Increased patronage | | ■ | | | | ■ | | | | | | | | | | | ■ |
| Enhanced attractiveness of place | | ■ | | | | ■ | | ■ | ■ | | ■ | | | | ■ | ■ | ■ |
| **Community benefits** | | | | | | | | | | | | | | | | | |
| Enhanced social cohesion | | ■ | | | | | ■ | ■ | | | | | | | ■ | ■ | |
| Enhanced community resilience | | ■ | ■ | | | ■ | ■ | ■ | ■ | | | | | | ■ | ■ | |

■ Value identified

Step 3

# Translating into value

VALUE FRAMEWORK DIRECTIONS

**Value translation**

Once the benefits have been mapped onto respective stakeholders, more focused conversations with prospective buyers and sellers of those benefits (or ecosystem services) can begin. More detailed assessments may be necessary to further define and/or quantify these benefits. Here, stakeholders can draw on a range of existing tools and methods.

As noted previously, a key challenge to the valuation of NBS is the rigid framing of its value in direct financial terms for a limited group of stakeholders. The majority of NBS' value exists outside of these boundaries; indirectly benefiting a much wider range of third party stakeholders. These can be considered as the **positive externalities** of NBS.

**Figure 11:** Positive and negative externalities

**POSITIVE EXTERNALITY**

When consuming or producing a good causes a benefit to a third party

Example:
Street trees reduce pollution

**NEGATIVE EXTERNALITY**

When consuming or producing a good causes a cost to a third party

Example:
Aviation causes increase in carbon emissions

### NATURE-RELATED RISK AND POSITIVE EXTERNALITIES

The Dasgupta Review, released in February 2021, laid out the need to embed nature within economic thinking and decision-making. The Review, commissioned by HM Treasury, was led by Professor Sir Partha Dasgupta and supported by an Advisory Panel drawn from public policy, science, economics, finance and business.

Since the Review launch, and following influential reports, such as that from IPBES on the threat of biodiversity loss, there has been an increased awareness on the omission of positive externalities in current financial accounting.

The Taskforce on Nature-related Financial Disclosures (TNFD) that launched in June 2021 has further added to the conversation. The TNFD is developing a framework to allow financial institutions and companies to assess and report on their nature-related impacts and dependencies. Several standards and tools have been developed to support the measurement of these nature-related risks.

Given the increased spotlight on nature-related risks and the value of biodiversity, it is anticipated that there will be an increasing inclusion of positive externalities within valuations and decision-making.



### WHAT ARE POSITIVE EXTERNALITIES?

Positive externalities occur when the production and consumption of a good or service benefits a third party not directly involved in the market transaction. For example, the provision of street trees can lead to higher patronage and additional revenue for local businesses.

Private markets will underproduce in the presence of such positive externalities because the costs of production for the firm are overstated and the profits are understated.

The current market approach, in which positive externalities are not embedded in overall value, can result in private markets performing below their capacity. For example, if NBS are value-engineered out of a project due to financial costs, but the wider values they deliver are not recognised effectively, then internalising these values (or positive externalities) could help deliver a wide range of benefits, whilst simultaneously providing a return to investors.

This report outlines a flexible approach that stakeholders can adopt, which begins to consider where financial flows could emerge to support a business case, following-on from the stakeholder-benefits mapping exercise.

It is important to note that there are different motivations for assessing NBS benefits, as outlined in Figure 12. Usually, one-to-one engagement is the most appropriate approach for establishing the value of an NBS intervention to a specific stakeholder. This will not consider all the benefits provided, but rather focuses on the specific ways in which value manifests for the identified beneficiaries. This is discussed in more depth in Chapter 4 – *Identify value streams.*

When assessing benefits to support decision making or options appraisals, a different approach might be more appropriate, such as the Enabling a Natural Capital Approach (ENCA) advocated by the UK Government. Such approaches support valuations that can establish monetary measures of those benefits. However, these approaches do not intend to capture that value for beneficiaries, but instead 'price it in' to decision making processes. This is referred to as non-market valuation. See Section 4.2 for more information.

**Figure 12:** Different motivations for assessing benefits and value

| | VALUATION FOR STAKEHOLDER BENEFITS AND VALUE TRANSFER | VALUATION FOR DECISION MAKING |
|---|---|---|
| **What is it?** | • Assessing project outcomes that directly affect stakeholders<br>• Place-based approach | • Holistic assessment of value independent of stakeholder engagement, independent of location<br>• Using 'official', universal values such as Green Book data |
| **When to use?** | • Proving benefits to stakeholders<br>• Engaging stakeholders with potential for additional financial streams for the project<br>• Real-life value transfer and capture of ecosystem services<br>• Outcomes based payments and payments for ecosystem services | • To incorporate NBS in decision making processes<br>• Proving overall value of NBS to investors, clients and developers |
| **How to assess?** | • Willingness to pay assessment/ Contingency valuation method<br>• Stakeholder engagement<br>• Process rather than assessment | • Natural Capital approach<br>• Various tools available |



## Identifying potential value streams

VALUE FRAMEWORK DIRECTIONS

**Step 3.1**
The translation of value refers to the transformation of a benefit (primary/ secondary) from a theoretical positive outcome into a tangible value. In other words, this is to make practical use of valuation evidence. This step is critical to support the development of any comprehensive business case for NBS, though is also the most complex and the most contested.

Stakeholders should focus on the secondary benefits defined and mapped in the value proposition (Step 3). With a secondary benefit and recipient in mind, stakeholders should consider the ways in which this value could be captured.

To assist this, 3 categories have been identified:

1. Direct financial benefit. Financial benefits are directly attributed to the service delivered. For example, land and asset owners benefit directly from enhanced land and property values resulting from possession of or proximity to NBS.
2. Indirect financial benefit. Financial benefits are indirectly attributed to the service delivered. For example, business owners stand to benefit from improvements to employee productivity as a result of regulated temperatures delivered via NBS.
3. Predominantly non-financial value*. Benefits that are not expected to return any financial value as part of the evaluated project. For example, pollination might be identified as a benefit that is incredibly valuable, but identifying a specific beneficiary with a willingness to pay may be difficult.

* Value that is defined as non-financial is not necessarily incapable of delivering financial benefits. However, this recognises that identifying direct or even indirect financial value might be challenging due to a current lack of evidence.

By framing the multiple benefits of NBS in this way, potential value streams emerge. These identify stakeholders or functions of particular importance, for example, where values (direct financial, indirect financial, and non-financial) are concentrated within the stakeholder-benefits map. This information ultimately supports the business case, outlining the key beneficiaries and any potential buyers and sellers of ecosystem services.

At this stage, stakeholders can build upon their initial value proposition by evaluating the identified benefits in greater detail, using a range of existing tools and metrics. Ultimately, this is highly individual and dependent on location, therefore the value stakeholders attribute to NBS and their benefits might vary significantly. Stakeholder engagement workshops and '**willingness to pay**' assessments such as the Contingency Valuation Method are useful tools to aid with this step. Table 6 provides an overview of the most common environmental valuation methods.

**Table 6:** Environmental valuation methods

| | STATED PREFERENCE METHODS | REVEALED PREFERENCE METHODS | COLLABORATIVE VALUATION |
|---|---|---|---|
| **Examples** | Contingency valuation.<br>Discrete choice experiment. | Travel cost method.<br>Hedonic pricing. | Extensive stakeholder engagement workshops. |
| **What it does** | Hypothetical prices obtained through asking users via surveys what they are willing to pay for benefits to the environment. As well as what they are willing to accept for the loss of the benefit or product. | Willingness to pay and accept values are attained based on data from observed spending behaviour and economic models. | Valuation of environmental goods are applied through collaboration between experts and relevant stakeholders to understand how potential benefits manifest in value for affected stakeholders. |

Other sources state higher figures. Research by Veisten et al. considers a 3% to 15% premium a good rule of thumb for assets that incorporate green walls or green roofs.[30]

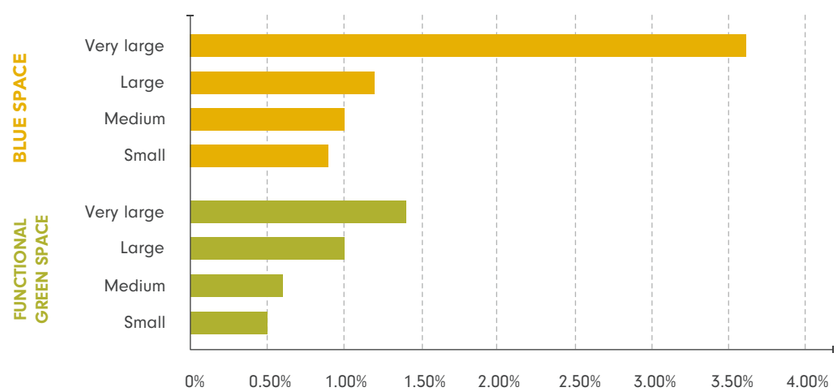
In environmental economics, willingness to pay refers to the monetary value a stakeholder is prepared to pay for the provision of a good or service, including non-market goods such as access to green space.

### Proving a direct financial benefit

Delivering direct financial benefits is the most convincing way of proving NBS are worthy of additional funding by affected stakeholders. This benefit can manifest in several ways, such as higher property and land value or increased economic activity of local businesses. Figure 13 shows data from the Office for National Statistics, concluding that green and blue infrastructure lead to an uplift in property value ranging from 0.5% to over 3.5% across the UK.



**Figure 13:** Impact of green and blue spaces on property values, Office for National Statistics[31]




### Proving financial cost savings

When cost savings are demonstrably provided to stakeholders, they can be engaged in discussions on using those funds, in part or in full, as part of the financing strategy for NBS implementation or maintenance. Examples for cost saving include lower insurance premiums due to reduction of physical risks such as overheating and flooding, lower energy costs due to insulating and cooling properties of urban green, and reduction of absenteeism resulting from health and wellbeing benefits of nature.

### Identifying non-financial value

Not having a direct financial benefit or cost reduction usually applies to non-market goods. Those goods, such as clean air, intact habitats or pleasant microclimate, are not traded in markets, meaning that their economic value is not revealed in market prices.

This does, however, not mean that no financial value or revenue stream can be identified. Where value is generated, a willingness to pay survey, or contingency valuation, is a tool used in environmental

CASE STUDY

**IGNITION, MANCHESTER**

- Implementation of SuDS on Moorlands Junior School led to an annual cost saving of £1,259.22, through increased water attenuation on site and reductions in the banding charge to the water provider.
- Consideration of an extensive blue-green roof within the Stockport Interchange redevelopment resulted in capital cost savings of £116,000 by avoiding the need for deep digging in contaminated soil and rock to install a storm attenuation tank. In addition, the blue-green roof will provide annual cost savings of £14,100/ year through reductions in the waste-water banding charge via attenuation on site.

economics to assign monetary value to non-market goods.

Table 6 gives an overview on a potential distribution of financial and predominantly non financial value generated on a project. Ultimately, detailed and in-depth stakeholder engagement needs to happen based on those findings if the value is to be captured.

VALUE FRAMEWORK DIRECTIONS

**Step 3.1**
Once you have established who the stakeholders are, what benefits will be delivered via NBS, and who the recipients will be in a given project setting (Steps 2.1 to 2.3), the Value Framework for NBS suggest undertaking a second iteration of the stakeholder-benefits mapping, this time adding information on whether the benefit is expected to be a direct or indirect financial benefit or delivers predominantly non-financial value. Table 7 shows a potential outcome of this exercise.

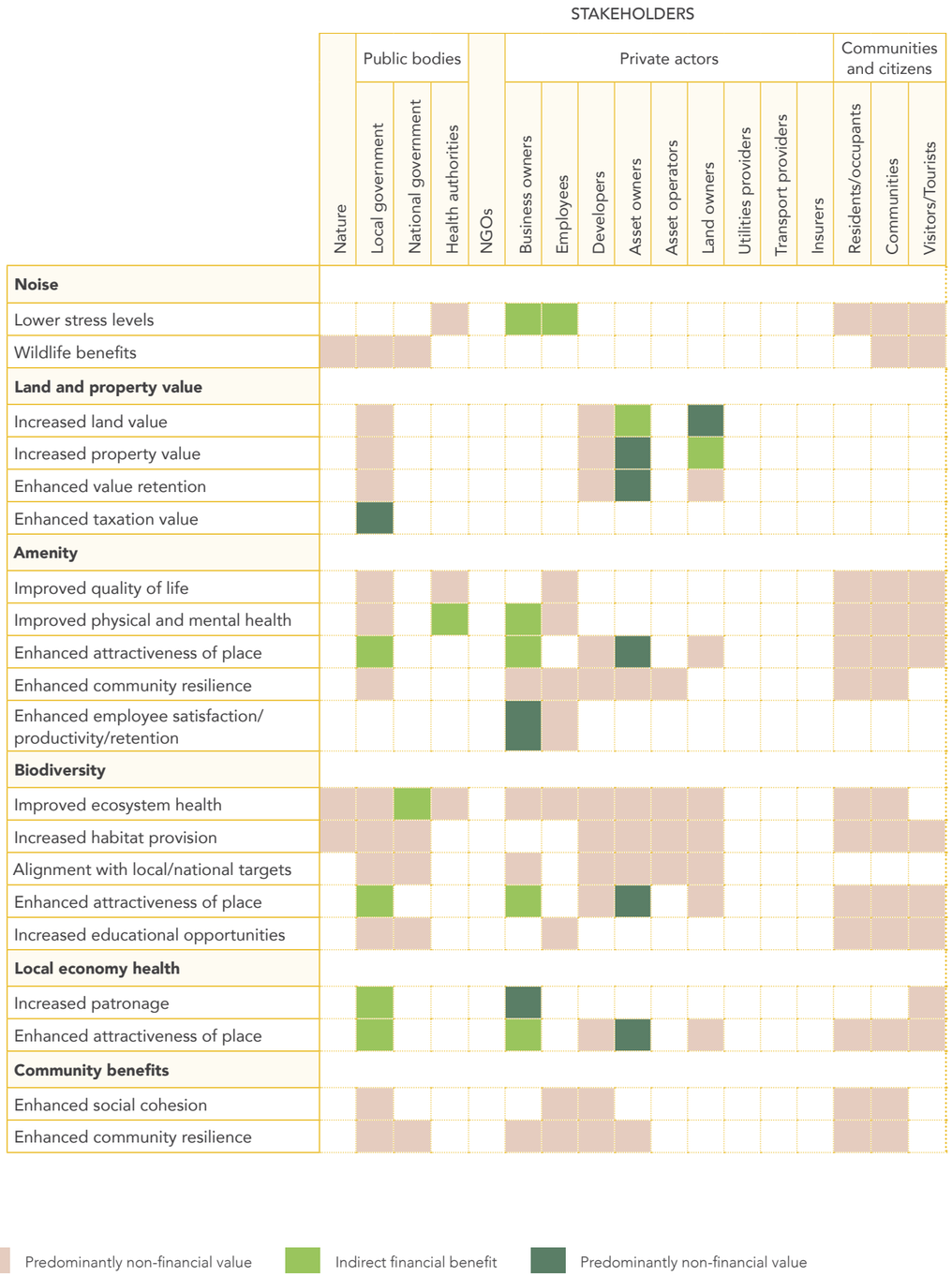
This can provide the basis for a subsequent targeted stakeholder engagement and a range of innovative finance opportunities or arrangements can emerge.



**Table 7:** Example stakeholder-benefits value map

STAKEHOLDERS

| BENEFITS AND IMPACTS | Nature | Public bodies: Local government | Public bodies: National government | Public bodies: Health authorities | NGOs | Private actors: Business owners | Private actors: Employees | Private actors: Developers | Private actors: Asset owners | Private actors: Asset operators | Private actors: Land owners | Private actors: Utilities providers | Private actors: Transport providers | Private actors: Insurers | Communities and citizens: Residents/occupants | Communities and citizens: Communities | Communities and citizens: Visitors/Tourists |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Air quality** | | | | | | | | | | | | | | | | | |
| Improvements to health | | ■ | ■ | | | ■ | ■ | | | | | | | ■ | ■ | ■ | ■ |
| Improved quality of life | | | | | | | ■ | | | | | | | | ■ | ■ | ■ |
| Reduced hospitalisations/deaths | | ■ | ■ | | | | | | | | | | | | ■ | ■ | ■ |
| Alignment with local/national targets | | ■ | ■ | | | | | ■ | | | | | | | | | |
| **Carbon storage and sequestration** | | | | | | | | | | | | | | | | | |
| Increased offsetting opportunities | | ■ | ■ | | | | | ■ | | | ■ | | | | | | |
| Enhanced CO2 removal | ■ | ■ | ■ | | | | | | | | | | | | | | |
| **Water quality and quantity** | | | | | | | | | | | | | | | | | |
| Increased flood resilience | | ■ | ■ | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| Preferential insurance premiums | | | | | | ■ | | | ■ | | | | | | | | |
| Lower risk of damage to asset(s) | | ■ | ■ | | | ■ | | | ■ | ■ | | ■ | | ■ | ■ | ■ | |
| Lower risk of disruption to business | | ■ | ■ | | | ■ | ■ | ■ | | | | | ■ | ■ | ■ | ■ | |
| Lower risk of disruption to civic infrastructure | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | |
| Lower sewer overflows | | ■ | ■ | | | | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| **Temperature** | | | | | | | | | | | | | | | | | |
| Reduced hospitalisations/deaths | | ■ | ■ | ■ | | ■ | ■ | | | | | | | ■ | ■ | ■ | ■ |
| Productivity | | | | | | ■ | ■ | | | | | | | | | | |
| Improved comfort/reduced stress | | | | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| **Energy use** | | | | | | | | | | | | | | | | | |
| Lower operating costs | | | | | | ■ | | | ■ | ■ | | | | | | | |
| Alignment with local/national targets | | ■ | ■ | | | | | ■ | | | | | | | | | |
| **Health and wellbeing** | | | | | | | | | | | | | | | | | |
| Improved physical and mental health | | ■ | ■ | ■ | | ■ | ■ | | | | | | | | ■ | ■ | ■ |
| Improved quality of life | | | | | | | ■ | | | | | | | | | | |
| Increased productivity | | | | | | ■ | ■ | | | | | | | | | | |
| Increased worker retention | | | | | | ■ | | | | | | | | | | | |
| Enhanced attractiveness of place | | ■ | | | | ■ | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ |






VALUE FRAMEWORK DIRECTIONS

**Step 3.2**
Assessing the cost is an exercise that happens throughout all project phases. As this is typically done by cost consultants and highly context specific, this report does not focus on cost. However, having clarity on cost is a prerequisite to comparative value assessments and is paramount to engage in discussion around financing strategies (see Step 4).

## Valuation for decision making

As discussed previously, the stakeholder benefits mapping approach assesses the highly local effects and benefits of nature-based solutions in relation to affected stakeholders. When value assessments of NBS are carried out mainly for decision making and options appraisal purposes, other methods are better suited. There are a variety of different approaches to assess the benefits of NBS, though most are framed around the provision of ecosystem services or natural capital. When undertaking more detailed assessments, the results will vary depending upon which approach or tool has been utilised. With these approaches, value is assessed holistically, independent of location and scale and for nature and society as a whole.

Multiple tools are available for assessing benefits, both qualitatively and quantitatively. They vary significantly in complexity and the technical expertise required to use them. Detailed assessments of benefits may not always be necessary, but they can help to foster stakeholder and investor confidence in the value(s) being created, and support the establishment of KPIs linked to positive outcomes, such as biodiversity or environmental net gains, to be included in ESG reporting.

Crucially, assigning a monetary value to natural capital or ecosystem services does not equate to actual financial value. Quantitative assessments can assist the decision-making process and incorporate financial values where previously excluded. However, there remains a gap between static valuations and mobilised funds for nature.

Stakeholders will need to consider what type of assessment is most suitable, depending on the context of the project and the benefits being assessed (refer back to Figure 12). However, it is most comprehensive to adopt a mixed methods approach that utilises qualitative and quantitative assessments. This is so that the shortcomings or biases present in any adopted assessment tool can be mitigated as best as possible.

**Figure 14:** Assessing functions, benefits, and value via concepts, standards, and tools

HM Treasury Greenbook

Natural Capital Protocol

Defra's Enabling a Natural Capital Approach (ENCA) Guidance

**TOOLS***

Tools are developing all the time – recommend checking the **Ecosystem Knowledge Network's "Tool Assessor"**. These are some available examples:

**1. QUALITATIVE**

- Nature Tool for Urban and Rural Environments (NATURE)
- Natural England's Natural Capital Atlas

**2. QUANTITATIVE**

- Natural Environment Valuation Online (NEVO)
- Benefits Estimation Tool (B£ST)
- Outdoor Recreation Valuation Tool (ORVAL)
- Natural England's Biodiversity Metric
- Environment Agency Natural Capital
- Register and Accounting Tool (available from the EA)
- Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) (requires GIS skills)

**3. DATABASES**

- Environmental Valuation Reference Inventory
- Environmental Values Look-Up Tool

**STANDARDS: WHAT DOES GOOD LOOK LIKE?**

- BS8632: Natural Capital Accounting for Organisations – Specification.
- BS 8683: A process for designing and implementing biodiversity net gain.
- ISO 14007:2019 Environmental management – Guidelines for determining environmental costs and benefits.
- ISO 14008:2019 Monetary valuation of environmental impacts and related environmental aspects

* Tools should be selected based on your objectives to achieve a proportionate approach e.g. qualitative tools like NATURE might be more useful for screening, while quantitative and monetary valuation tools will be more useful for options appraisal and investment cases e.g. NEVO, Atkins' NCS. Many tools can be daunting for non specialists and require time investment to use effectively.



When assessing the use of any tools outlined in Figure 14 (or available elsewhere), some key considerations for developers include:

- **What background knowledge is required?** An understanding of basic concepts of natural capital and ecosystem services and how they can add value to investment decisions you need to make.
- **Which tools can be used without third party input?** Some tools can be used by developers with no additional professional help (e.g. NATURE was designed 'by and for industry') but this requires ownership and dedicated time to get right. It is likely that an increase in technical knowledge will be required to use the tools.
- **What should suppliers be asked to do?** They need to understand the project's needs so that they can identify proportionate solutions; ensure natural capital assessments are ENCA compliant; depending on stage of the decision making process, a qualitative or quantitative approach may be needed; adherence to standards; third party assurance or peer review for high profile projects.

CASE STUDY

### 445 Hammersmith Road, Legal and General

New build planned in 2016 and delivered in 2019 with NBS used to link inside and outside via terraces and gardens, and the local community is actively encouraged into the building. In order to deliver their vision, L&G purchased surrounding interests to create an urban park. Social value assessment, via the Social Value Portal, has been undertaken and embedded into the brief for the constructor and project team. Across their portfolio, L&G found a £5/sqft increase in value due to access to outside air. This figure is expected to increase as an effect of increased health awareness following the Covid-19 pandemic.

Step 4

# Financing strategies

VALUE FRAMEWORK DIRECTIONS

### Financing strategies

To capture value on a specific project, detailed discussions with stakeholders are required, determining willingness to pay, calculating achievable cost reductions, and considering potential cost uplifts. Assessment tools can provide a basis for deciding the amounts attributed to positive outcomes within a project.

Once these benefits have been assessed, mapped, and translated into respective values for a range of stakeholders, business models can begin to develop. Building on the insights from Steps 1—3 of the Value Framework, stakeholders can identify where funding could be drawn, where innovative opportunities and partnerships can arise, where existing models and mechanisms can be utilised, or where novel approaches could be developed and matured.

Financing opportunities for NBS are currently limited. There are several barriers deterring the flow of private finance to support upfront investments in NBS, most of which are derived from a lack of understanding and/or rigid and immature quantifications of the value of NBS.

However, financing opportunities are expected to grow with the emergence of more standards, the UK Green Taxonomy, and the Task Force on Nature-related Financial Disclosures (TNFD), as well as the maturing and expanding evidence base for the value of NBS. Current challenges for financing NBS include:

- Lack of awareness of actual value creation and benefits generated by NBS.
- Capacity and skills constraints for interventions.
- Lack of financial products to support NBS development.
- Lack of knowledge on what financial models and funding are available.
- Perception that maintenance costs are being hard to predict (whereas grey infrastructure maintenance cost are accepted as business as usual).
- Lack of clarity around who should be providing and financing the NBS.
- Lack of supportive policy and regulatory framework.

### Using the stakeholder benefits mapping for financing

Current models for financing look to engage beneficiaries of nature-based solutions as buyers of outcomes, in order to secure lending or upfront investment to cover costs. The suggested stakeholder benefits mapping is an ideal tool to scope out buyers and sellers specific to the project in question. The following is a theoretical outcome of this kind of analysis, enabling a more in-depth conversation about capturing value:



CASE STUDY

Example

Property developer A plans to plant street trees outside its new development and a green wall. Using the stakeholder mapping tool, Property Developer A has assessed that the local authority has made commitments to clean air and rainwater retention. In addition, local business owners are likely to benefit from increased footfall. Finally, the property valuation has the potential to be increased due to the beautification of the project, but also the lower energy costs to tenants provided by the green wall. There are several options here for Property Developer A when considering how to finance NBS:

- Identify and access local authority grants.
- Asking beneficiaries such as local businesses to contribute.
- Increase unit costs.

As this example shows, NBS are highly context-specific and any approach needs to be carefully tailored to beneficiaries, location, scale and kind of intervention.

VALUE FRAMEWORK DIRECTIONS

**Step 4.1**

Bespoke financing mechanisms are often a solution to incorporate positive externalities via direct or indirect financial benefits that are included and accounted for or via desired (non-financial) outcomes, resulting in a willingness to pay. In general, the following need to be identified collaboratively to underpin the business case:

- Identify willingness and ability of stakeholders to pay.
- Identify returns over time to increase investor confidence.
- Define capital and maintenance costs.

Defining KPIs that can be tracked and measured over time will be crucial for any outcomes-based finance approach, be it via direct payments from beneficiaries or investments from Environmental Impact bonds or loans that track the performance of the project. Examples for such KPIs include monitoring of air quality, number of businesses attracted, net additional jobs created and water absorption capacity of NBS.

**Step 4.2**

Financing strategies highly depend on the scale of the project. Many financing opportunities are currently in their infancy, but maturing rapidly. Once the appropriate scale of the project has been identified, the next step is to understand which of the funding sources and instruments are applicable and whether grants are available for the specific circumstances of the project.

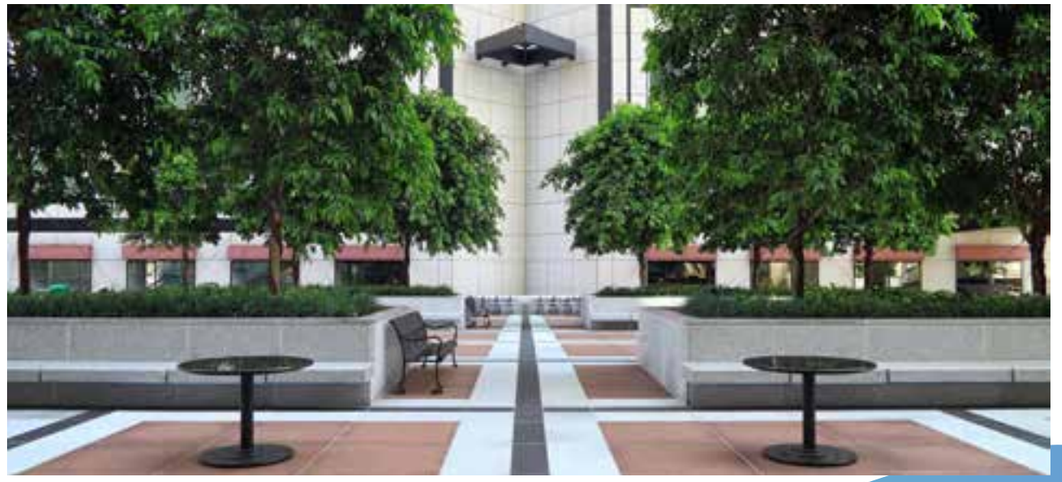
Developed within the Connecting Nature Project, CO-IMPACT is a decision-support tool allowing local authority officers and cities to create impact assessment plans for their NBS/projects. The main objective is to make the process of building a baseline and impact assessment plan straight forward and simple for anyone who wishes to do so, with the final report providing advice around suitable methodologies based on scale and project characteristics.

Table 8 gives an overview of different financing scenarios depending on the project circumstances based on key characteristics, suggesting which steps of the framework will most likely be applicable as well and indicating financing instruments that are likely to be suitable.

**Table 8:** Financing scenarios for asset owners, developers and investors

| | PROJECT SUITABILITY | FRAMEWORK STEPS | ADVANTAGES | POTENTIAL FINANCIAL INSTRUMENTS |
|---|---|---|---|---|
| **Scenario I: Business as usual plus NBS.** Incorporate NBS as part of project budget | • Small scale NBS or low CAPEX.<br>• Business as usual scenario for most projects | Steps 1 – Step 2 | • Decreases risk of NBS intervention being lost in value engineering (due to clarity on benefits of NBS).<br>• Helps recognise and realise value.<br>• Ensures all created value is perceived as part of the project | N/A |
| ↓ | | | | |
| **Scenario II:** Secure additional finance directly from beneficiaries | • Small to large scale.<br>• Stakeholder-benefits mapping identified viable direct financial value.<br>• Engagement with beneficiaries. | Step 1 – Step 4 | • Provides additional investment.<br>• Garners wider support from stakeholders for the project | • Contracts with paying beneficiaries.<br>• Potential outcomes-based payment models.<br>• SPVs or other legal entities |
| ↓ | | | | |
| **Scenario III:** Additional external funding through public, private or blended finance | • Medium to large scale projects.<br>• Your CAPEX is covered by a government grant or other schemes, i.e from local authorities | Step 1 – Step 2 (Potentially to Step 4) | Provides additional investment | • Traditional or green bond.<br>• Traditional or green loan.<br>• Government grants.<br>• Potential for blended finance |
| ↓ | | | | |
| **Scenario IV: Outcomes-based payment models.** Secure additional private/ public upfront funding to be paid back via outcomes-based payments over time. | • Large scale projects.<br>• Strong stakeholder engagement | Step 1 – Step 4 | • Potential to co-finance NBS applications that are outside of strict project budget.<br>• Provides evidence of success, therefore supporting replication.<br>• Garners wider support from stakeholders for the project | Outcomes-based model such as an EIB |





## Overview of funding sources

### Public and philanthropic funding sources

- Government including government agencies and local government.
- Foundations.
- NGOs.

Public funders have a history of including value includes non-monetary benefits to society and the environment into their assessment and will be more likely to offer finance at lower levels of return.

### Private funding sources

- Commercial banks.
- Investment companies including impact investors.
- Private equity funds.
- Infrastructure funds.
- Developers.
- Private sector beneficiaries i.e. shops, utilities.

### Blended finance

Blended finance uses public funds to de-risk and attract additional private finance. Using this approach private funds can be channelled into NBS financing with a lower risk, making the case for investability and creating the evidence base and confidence needed for increased private finance in the future.

## Potential non-traditional funding instruments

### Environmental Impact Bonds (EIBs) and Outcomes-based Payments

Upfront funding is provided typically through a straightforward loan, and the repayment is linked to the delivery of established outcomes using a set of pre-defined KPIs. EIBs are a form of outcomes-based payment where the upfront funding is raised via a bond. There are several examples of EIBs in the United States including the DC Water Bond.

### Green bonds

Green bonds have been rapidly growing in popularity. Green bonds differ from traditional bonds in that their proceeds are used for sustainability-related projects. As such, investors can be prepared to take a discount in yield or coupon, thereby offering issuers the so-called 'greenium' of cheaper financing.

### Green loans

Green loans are similar to green bonds, but smaller in size. Since loan payments are dependent on NBS implementation, it anchors the sustainability objectives right at the heart of the project, helps to safeguard the objectives against any value engineering exercise and makes it easy to communicate their necessity to the supply chain.



### Community Municipal Investments (CMIs)

Community Municipal Investments enable Local Authorities to raise financing from investors (typically residents) to pay for investments in climate solutions such as solar panels, but also, as in the case of West Berkshire, to pay for nature restoration or enhancements.

### Special Purpose Vehicle

Legal entity, e.g. in the form of a limited company, that serves as a centre point for managing cash flow and isolating financial risk.

CASE STUDY

**RIVER WYRE NATURAL FLOOD MANAGEMENT PROJECT**

DEFRA, the Environment Agency (EA), Esmée Fairbairn Foundation (EFF) and Triodos Bank UK have formed an innovative collaboration to support environmental projects to create sustainable funding models. This pilot is developing a financial instrument that would allow upfront investment from the private sector to be reimbursed by the beneficiaries of a healthier environment. Intervention benefits will include property and business flood protection, biodiversity and habitat creation, water quality improvements, carbon sequestration and improved recreational value and land management. Over a 30 year period, this project is estimated to provide 15x the return of the investments, according to the cost-benefit analysis.[32, 33]

CASE STUDY

**IGNITION, MANCHESTER**

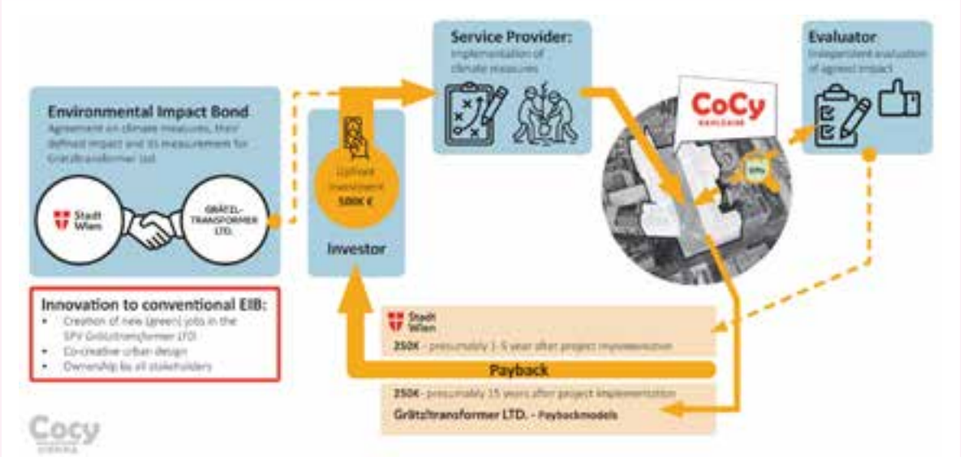
United Utilities, the wholesale water and wastewater management company for the Greater Manchester area, charges non-domestic properties for wastewater services based on the area of hardstanding, such as buildings and carparks, on their site which drains into the sewer system. By incorporating SuDS into these sites, landowners can reduce their chargeable area, allowing it to drop a charging band. The cumulative savings of that approach can then be used to borrow against, giving the lender the necessary securities for financing the intervention.

CASE STUDY

## GREEN DEAL NEIGHBOURHOOD COCY, VIENNA

CoCy is the Viennese development project for the implementation of climate-friendly neighbourhoods in Europe. The fields of action planning – mobility – governance/participation – financing and communication are brought to climate-relevant action in a co-creative process. Through the structural integration of a special purpose vehicle (SPV) as new umbrella organization, a legal entity has been created for new upfront financing via an environmental impact bond (EIB), using public and private sources for payback over time, based on pre-agreed impacts and KPIs.

The main benefits that have been targeted are the cooling effect of urban green, space for more green and people is created, the mobility turnaround is promoted, carbon reduction, job creation, and community benefits via the co-creation with local residents. The new process design aims to enable timely scaling and implementation across Europe and beyond.[34]




# Appendices

### Table 3: Methodology

The NBS functionality/performance data presented in the radar graphs in Table 3 was produced using mixed methods. Two secondary data sources were utilised, principally the IGNITION NBS Evidence Base and the data underpinning the Urban GreenUP NBS Selection Tool.

The data was primarily quantitative; the Urban GreenUP Selection Tool provided a range of scores that ranked the functionality of a wide range of NBS types against particular benefits. The IGNITION data was categorised according to the 5 NBS typologies we outline in this report, and provided extensive detail regarding 11 of the 12 primary benefits we include here.

From the IGNITION data, we took the number of evidence items per NBS benefit for each typology and determined the interquartile range, which indicated where the most evidence existed in relation to each benefit. As the presence of evidence items alone does not necessarily equate to a positive functionality (i.e. the evidence may actually document poor benefit provision from the NBS), this information was supported by written summaries within the IGNITION NBS Evidence Base that qualitatively evaluated the performance of the NBS and the provision of the benefits.

This assessment was, where relevant, then further cross-examined against the Urban GreenUP scores, ensuring that the overall efficacy of each NBS typology was supported by both datasets, which incorporated both quantitative and qualitative information. The results presented in the radar graphs are the cumulative outcome of this mixed methods approach and the qualitative judgements made in relation to the two datasets.

### Full list of primary and secondary benefits with sample beneficiaries

The benefits and beneficiaries list is intended to assist the translation of primary benefits into more context-specific secondary benefits for a range of stakeholders. It should be noted that this is intended as a starting point, therefore not exhaustive, and users are encouraged to add to the list where further benefits or beneficiaries can be identified. Find the full list here. This list can be used in conjunction with the stakeholder-benefits mapping tool to develop a holistic value assessment of NBS.

### Stakeholder-benefits mapping template

The complete template for the stakeholder-benefits mapping can be accessed here.

# Acknowledgements

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**QUESTIONS & FEEDBACK**

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

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