

Revenues for Nature Guidebook Series

Biodiversity Net Gain, England

October 2024



Revenues for Nature Project

Revenues for Nature (R4N) is a global project led by the [Green Finance Institute Hive](#), in partnership with [UNDP Biodiversity Finance Initiative \(BIOFIN\)](#) and [UNEP Finance Initiative \(UNEP FI\)](#).

R4N aims to contribute to the achievement of [Target 19](#) of the Kunming-Montreal Global Biodiversity Framework (GBF) by supporting countries in identifying and implementing effective models for mobilising private sector finance into nature restoration and conservation.

The project's three pillars of work include:

- 1. Knowledge Sharing**, with the publication of a series of detailed Guidebooks capturing how to establish, replicate and scale high-integrity nature-based revenue models. The Guidebooks are complemented by a database of nature-based revenue models and markets that mobilise private sector finance into nature conservation and restoration.
- 2. Multistakeholder Learning** via a Community of Practice which includes the private sector, governments, investors and funders, and project developers to support shared learning for the development of nature models and markets.
- 3. Implementation** plans to support governments and relevant partners in rolling out impactful nature-based revenue models.

R4N is funded by the [Gordon and Betty Moore Foundation](#).

Guidebook Series

The R4N Guidebook Series provides an in-depth analysis of models across the globe that unlock private sector capital into nature restoration or protection, including nature-based solutions (NbS). Each Guidebook offers detailed insights into the development of these models, the enabling conditions that allowed them to succeed, along with key lessons learned. The series examines the ecological, political, and socio-economic factors that support the replicability and scalability of these models in diverse regions, and explores how these models can generate revenue and improve biodiversity while leveraging some private sector financing.

The R4N Guidebook Series currently include:

- Biodiversity Net Gain, England – October 2024
- Wetland Mitigation and Endangered Species Habitat Banking, United States – October 2024
- Habitat Banks, Colombia – October 2024
- Nature-based Models for Unlocking Private Investment into Water Quality and Availability, Part 1– October 2024

The next publications of the R4N Guidebook Series will be released in the first half of 2025.

The Guidebook Series is aimed at policymakers, corporates and investors who are interested in scaling high-integrity models to mobilise private sector capital at scale into conservation and nature-positive outcomes.



About this Guidebook

For those interested in replicating or adapting England's BNG scheme for use elsewhere, this Guidebook serves as a worked analysis of how the English government – working with various sectors and stakeholders – developed its mandatory BNG policy and launched it in 2024.

It breaks down the major components of BNG policy, why they were designed and how they were implemented. It also reflects on how mandatory BNG has been performing in the eight months since its launch, highlighting that this is an environmental policy in its early stages. Finally, there are also comparisons with biodiversity compensation schemes around the world, to help demonstrate the potential variations of a BNG scheme. Lessons learned are highlighted throughout the Guidebook.

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Executive Summary

Biodiversity Net Gain (BNG) is an environmental requirement launched by the English government in 2024. It legally requires property developers to demonstrate a measured 'no net loss' of biodiversity and a Net Gain of 10% - using a combination of avoidance, **on-site mitigation** and **off-site compensation** (delivered by local landholders) of habitats that are maintained over 30 years.

England's BNG is not the first biodiversity compensation scheme of its kind and draws on the learnings of previous models and initiatives around the world. This includes the highly influential work of the Business and Biodiversity Offsets Programme (BBOP), which ran from 2004 to 2018.

However, key features of England's BNG model include:

- its use of a single, standardised metric – which allows for scale, efficiency and comparability across different biodiversity sites and outcomes across England.
- its mandatory basis – which supports consistency in the policy's application.

However, as of October 2024 the policy is just eight months into its launch. It is therefore too soon to tell the extent to which it will deliver its targeted benefits, including but not limited to habitat creation and maintenance across England.

Nevertheless, the launch of England's mandatory BNG policy has drawn considerable international attention. Following the adoption of the Kunming-Montreal Global Biodiversity Framework and associated National Biodiversity Strategy and Action Plans (**NBSAPs**), many countries are now determining how biodiversity restoration and protection can be reconciled in land use planning, and whether 'off-site' compensation models like BNG can be used for biodiversity where land is taken away for other uses.

England's BNG policy has evolved over 15 years. That process, the resulting elements developed and lessons learned can serve as useful examples for other countries that are considering similar models, particularly in support of **Targets #15 and #19** of the Global Biodiversity Framework.

Key recommendations on the adoption of a BNG model

For other countries and regions considering a BNG model, England's newly launched scheme offers key reflections and lessons learned. However, these should be reviewed and compared within relevant social, economic, political, and ecological contexts.

Depending on the specific circumstances, it is likely that BNG will not be an appropriate or feasible choice for every country or region considering it. To help determine the level of suitability, there are key recommendations from England's model that any stakeholder can think about.

Some of these key recommendations include:

1. Set **clear policy objectives** that are aligned to relevant biodiversity targets and feasible outcomes. Pair these with **core principles** that will guide the model's development and implementation. See *Principles of England's BNG model*.
2. Make sure that there are **defined roles** within central governance bodies (such government department and ministries) to develop and implement the model. See *Policy, Legislation and the Role of Central Government*.
3. Ensure there is a **strong and well-funded governance body** or set of bodies that can assess, approve/deny, monitor and enforce activities – both on-site and off-site – that actors commit to as part of their BNG plans. See *Establishing Local Governance*.
4. Build adherence to the **mitigation hierarchy** in the model, recognising that this is a shared responsibility and that detailed and practical guidance is needed for plans to be designed and assessed to deliver robust biodiversity outcomes. See *Principles of England's BNG model*.
5. Build in **transparency** throughout the model, including the use of registers to provide information publicly on how habitat plans are being planned and executed, and what outcomes have resulted – both on-site and off-site. See *Establishing Central Governance*.
6. Incentivise the up-front establishment of habitats before they are used to offset impact (ex-post), preventing temporal loss of biodiversity – termed **habitat banking** in England's BNG model – but assess the economic feasibility of this for off-site providers and how this may translate to levels of ready supply. See *Working with the Supply Side*.
7. Use a metric or set of metrics that rely on **robust proxies** for biodiversity, are **useable** by the target audience, and have been designed with the **target impact** in mind. Share versions of the metric(s) early with the public so that these can be tested and improved by business and civil society. See *Developing a Biodiversity Metric*.
8. Make sure there is **ample biodiversity data** for baselines, additionality tests, counterfactuals and trading rules to be applied and adhered to by market actors. See *Developing a Biodiversity Metric*.
9. Make sure there are clear boundaries for **non-offsetable impacts and no-go scenarios**, and clarify where the model intersects with **existing environmental policies and protections**. See *Developing a Biodiversity Metric*.
10. Create a comprehensive **monitoring and evaluation strategy** for the overall model, aligning this with reporting requirements and systems that are used by market actors on the ground. See *Policy, Legislation and the Role of Central Government*.

11. Embed **landscape level planning** within the model, so that market actors are incentivised to avoid harm of, and direct compensation towards areas of higher ecological value within local landscapes. See *Establishing Local Governance*.
12. Use **pilots and research programmes** to test the design and delivery of effective biodiversity gains – both on-site and off-site – as well as the true cost of delivering these over a set period of time. This includes what incentives, legal structures and financial mechanisms may be necessary or useful to secure such gains. See *Working with the Supply Side*.
13. Make sure **adaptive management practices** can be built into ongoing habitat management – both on-site and off-site. See *Working with the Supply Side*.
14. Ensure there is **ample supply** ready (especially if considering a mandatory basis) including different options for demand-side actors to rely on. Consider also how supply and demand will be **appropriately matched**. See *Policy, Legislation and the role of Central Government*.
15. Set clear scope of what **impacts and activities** are being targeted. Conduct a spatially explicit assessment of these to assess the feasibility of delivering BNG – giving an idea of both the scale of the impact and how it aligns with the biodiversity targets and outcomes desired. . See *Working with the Demand Side*.
16. Ensure that requirements of demand side actors are **feasible and proportionate** to their size and means. Consider phasing in different demand side actors and activities as the model becomes more established. See *Working with the Demand Side*.
17. **Consult** with public stakeholders on a regular basis in the policy’s development and implementation – including businesses, landholders, local government, and civil society. **Provide visibility** over the way the policy is being developed and expected timeframes.
18. Bring in **supportive sectors** into the model’s design and implementation that will be needed to support core actors – including ecologists, legal advisors, financiers, insurers and technology providers. See *Linked Professions and Stakeholders*.
19. Ensure that **Indigenous Peoples and Local Communities** (IPLCs) are engaged in both the development and ongoing implementation of the model, such as how IPLCs can be engaged and consulted on local BNG plans. See *Linked Professions and Stakeholders*.
20. Develop a **roadmap** to plan the introduction and evolution of the BNG system over a few years - covering legislation, policy, guidelines, methods, governance and capacity building, working with core actors.

What is England's Biodiversity Net Gain model?

This section describes what England's Biodiversity Net Gain model is and its key principles.

Biodiversity Net Gain (BNG) is a development policy designed to ensure that certain property development – such as housebuilding, commercial developments, transport and energy infrastructure – result in a measurable improvement in biodiversity compared to the pre-development value of the site (+10%).

The 10% Net Gain is measured using the English government's statutory biodiversity metric, which uses habitat as a proxy for biodiversity. Habitats that are created or restored will generate biodiversity units¹ for property developers.

Property developers, such as housebuilders, can achieve this 10% Net Gain requirement through a combination of avoidance of impact, on-site compensation and – if required – off-site compensation (offsets), where developers implement or pay third parties to deliver habitat uplift nearby. Property developers must show how they have followed the mitigation hierarchy, which prioritises avoidance of impact first and use of off-site compensation last.

Mandatory BNG was phased in for different property developers, with major site developers introduced in February 2024, small site developers (typically of one hectare or less) introduced in April 2024. BNG requirements for Nationally Significant Infrastructure Projects (NSIPs) – such as rail transport, airports and power lines – are expected to be introduced from November 2025.

Off-site providers who wish to provide biodiversity compensation, such as farmers and environmental NGOs, must also use the statutory biodiversity metric to measure what potential units they can sell to property developers. They must create habitat management and monitoring plans that span over 30 years and then secure the use of the land for BNG with a land covenant, which creates a legal obligation to carry out the agreed habitat enhancement, even if there is a change in land ownership.

Land covenants are similar to conservation easements,² which are used in the United States, Australia and France.

Any off-site compensation must also be recorded on the national biodiversity gain sites register, which hosts public information on the off-site habitat plans and ensures that no resulting units are sold more than once.

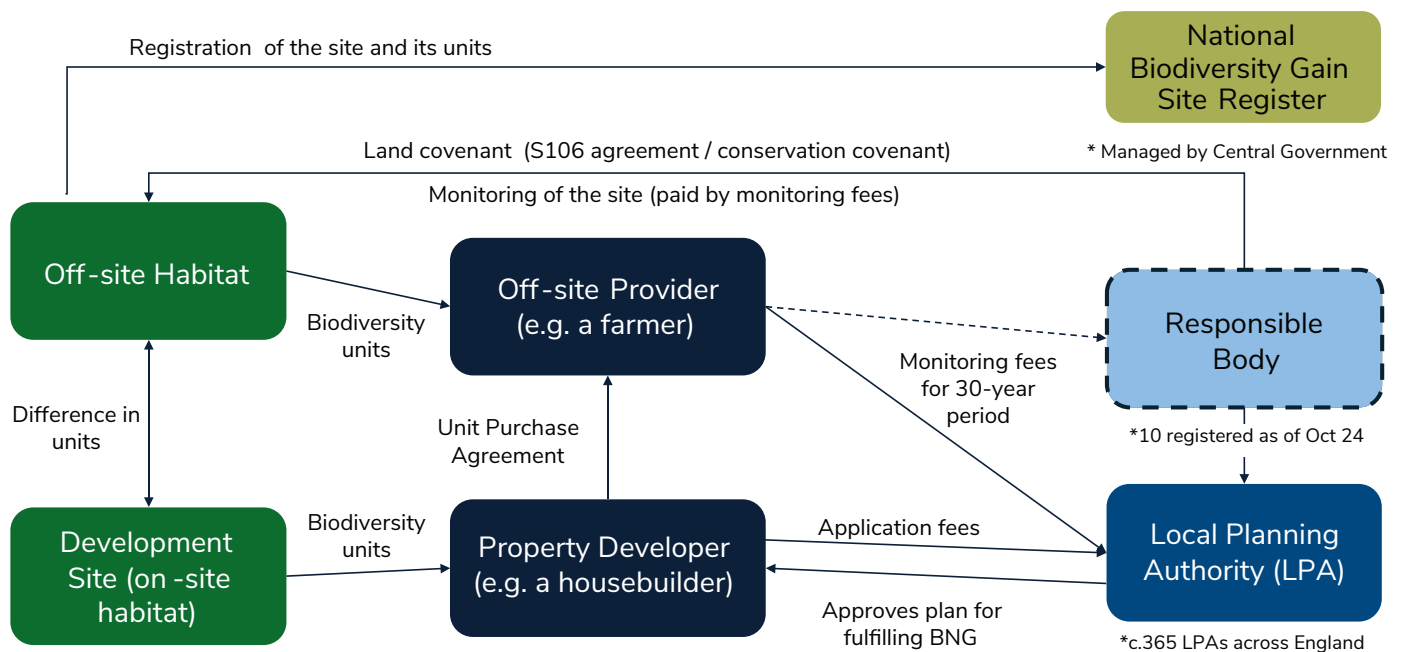
¹ In England's BNG model, there is a difference between units and credits - units are provided by third parties in the market, and credits are provided by the government through its 'last resort' statutory credit programme. By design, government credits are more expensive and restricted in use.

² Conservation easements are a voluntary and legally-binding agreement, similar to a deed restriction, that permanently limits a property's uses in order to protect conservation values and achieve conservation goals.

Underpinning all of this is the Local Planning Authority (LPA), which in an international context can be considered the local municipality in charge of assessing and approving local development plans. The LPA assesses the planning application of the land developer – including their plans to meet their BNG requirement – and monitors any on-site habitats that contribute significantly to the developer's BNG target over the 30-year period. LPAs can also serve as the monitor and enforcer of off-site habitat plans by offering land covenants to off-site providers, in exchange for monitoring fees that they set.

Within the context of BNG, Responsible Bodies can offer an alternative land covenant called a conservation covenant to off-site providers for the monitoring and enforcement of their habitat plans over the 30-year period. As with LPAs, Responsible Bodies set their own fees. As of October 2024, there are 10 Responsible Bodies in England. Responsible Bodies are discussed in further detail in Establishing Local Governance.

Figure 1: Introducing England's BNG model



Principles of England's BNG model

Many of BNG's core principles can be traced back to the first 10 years or so of its inception. These are set out below in further detail:

- **Incentivising sustainable land development through the planning system**

At its core, BNG is designed to change the way development takes place in England, addressing the small but incremental damage that each development can have on biodiversity. It is a mechanism that aims to:

1. Change where development happens – influencing development locations from high to low-biodiversity value sites by costing biodiversity losses into developers' decision making.
2. Change how development happens – including what measures developers take to minimise impact on the development site (see *mitigation hierarchy* below).
3. Create a market for nature-based solutions – offering off-site compensation where impacts cannot be fully mitigated on-site.

It is important to emphasise that, while the BNG model tracks how much on-site and off-site habitat is created or restored, its impact also lies in where development does not take place. Recognition, through the metric, of where high-value biodiversity sites are not suitable for development is also an impact that should not be underestimated, though it is considered more difficult to measure.

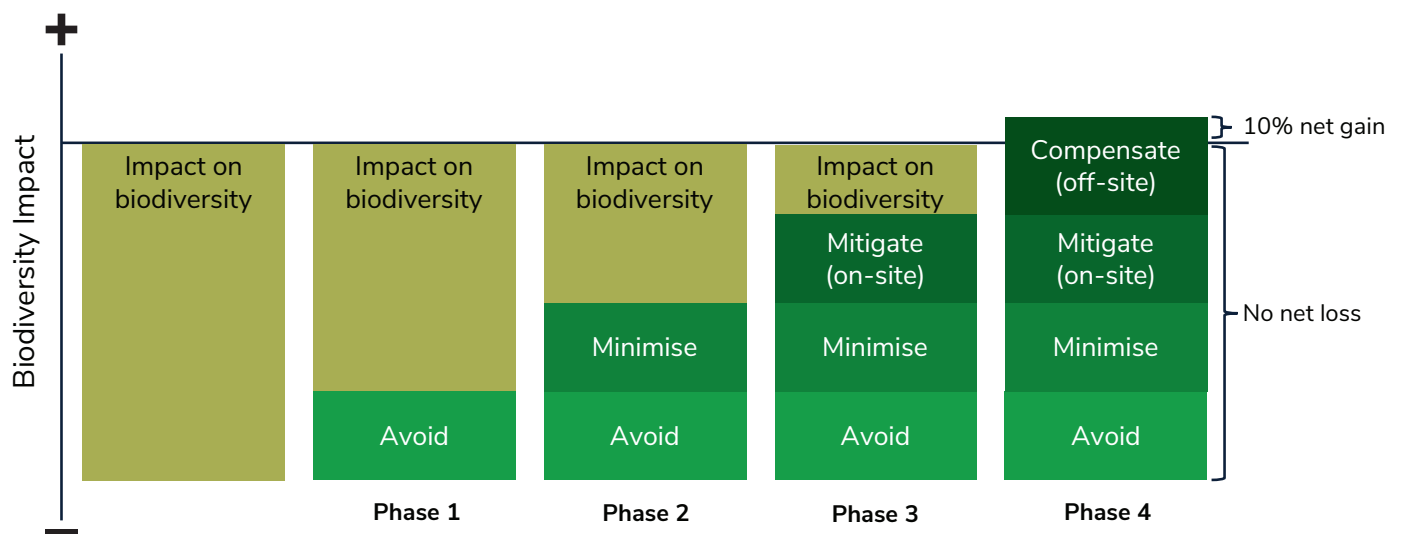
England's planning system manages and controls land development to ensure that the right land development happens in the right place. It was therefore seen as the appropriate system to use for BNG policy.

- **Adherence to the Mitigation Hierarchy**

The mitigation hierarchy is embedded in England's BNG policy design, as property developers are required to show LPAs how they:

- first avoid impacts on existing habitats,
- minimise impacts through changes in their design,
- mitigate impact through restoring or creating new habitats on-site,
- compensate any residual impact by using biodiversity improvements from land off-site.

Figure 2: Mitigation hierarchy of BNG



Globally, the mitigation hierarchy is often adopted as a core concept that ensures biodiversity offsets are used after all reasonable measures have been taken first to avoid and minimise the impact of a development project and then to restore biodiversity on-site”.³

England's adoption of the mitigation hierarchy was a key outcome of the English government's 2012-2014 offsetting pilots. These showed that many stakeholders – including leading environmental organisations – did not want the government to grant developers a 'license to trash' where they could simply pay to create compensatory habitat elsewhere in an unrestricted way. The concept of the mitigation hierarchy allowed the government to move away from the general concept of biodiversity offsets towards a BNG policy and market-based mechanism that support the use of offsets in an ecologically responsible manner.

³ The concept of a mitigation hierarchy is set out in greater detail in the work of BBOP, which strongly advocated for the use of the mitigation hierarchy through its central guidance of creating robust biodiversity offsets.

Alongside incentivising the protection of existing habitats, the mitigation hierarchy is also considered an important feature for preserving local communities' access to and benefits of nature. As England is spatially constrained and there is a relatively strong focus on preserving people's access to and benefits of nature, the mitigation hierarchy – coupled with the spatial risk multiplier (see *Developing a Biodiversity Metric*) – were positioned as key features that would ensure BNG would deliver local community benefits.

However, some stakeholders within England's BNG landscape argue that off-site delivery is often more effective and robust in delivering biodiversity uplift than on-site delivery. Their rationale is that on-site delivery is often through small, more fragmented parcels of land that face anthropogenic or urban pressures (such as proximity to residential areas) that mean habitat uplift is unlikely to be achieved over the 30-year period. These stakeholders generally advocate for more stringent assessments of property developers' on-site plans that would translate to greater volumes of off-site BNG delivery, which they believe has a better chance of delivering biodiversity gains. There are also concerns of unequal governance standards between on-site and off-site habitat uplift – such as the lack of a bespoke register for on-site habitat gains.

In comparison, a national example of where the mitigation hierarchy is not strictly followed is within the US wetland and streams mitigation programme. Companies (developers) that impact upon wetlands and streams are first incentivised to use pre-established (ex-post) habitats, which are most often provided off-site by private mitigation banks. This 'mitigation hierarchy preference' was put into US national policy in 2008, when ecological research found that predicted (ex-ante) habitat plans – often used for on-site compensation – delivered consistently poorer outcomes due to unequal standards and enforcement. The 2008 rule established a clear preference for ex-post habitats and raised the standards of developer-led (often on-site) mitigation. On-site compensation now accounts for less than 20% of the programme's outcomes.



Lessons learned

- A rigorous approach to the mitigation hierarchy is a shared responsibility. Scheme owners can require their developers or equivalent demand actors to follow the mitigation hierarchy, but detailed guidance and practical tools are needed for plans to be proposed and assessed in a way that delivers real benefits to biodiversity.
- The creation of a BNG scheme benefits from the collaboration of government with relevant industries, including environmental organisations, to clearly identify what following the mitigation hierarchy looks like in practice. This includes where it may be more ecologically beneficial to deliver biodiversity gains through off-site compensation.

- **Mandatory, not Voluntary**

BNG is a legal requirement for property developers, which must prove how they plan to deliver on the 10% Net Gain requirement over a 30-year period before they are allowed to develop the land. LPAs are also legally bound to assess these plans as part of their planning duties.

Benefits of a mandatory approach include the scale over which BNG outcomes can be realised (the whole of England) and the consistency by which processes are followed, such as the use of the single statutory biodiversity metric. Fundamentally, mandatory BNG was positioned as a way to create a 'level playing field' between all developers, so that different (or absent) BNG requirements would not create economically unequal impacts across different developer types and geographies within England.

Previously, BNG was enacted through planning policy for over 10 years, which allowed LPAs and property developers to create or trial their own BNG schemes on a voluntary basis. Benefits from this period included a wide range of mechanisms and strategies to be trialled and developed. For example, different metrics, legal contracts and insurance mechanisms were used, which were all taken into consideration by England's central government when consulting on mandatory BNG.

However, some property developers felt burdened with the varying requirements of LPAs. Several LPAs also attempted to introduce or strengthen their BNG requirements, but were challenged by developers on the grounds that it would threaten their financial viability. On a national level, the proliferation of metrics made it impossible to compare projects and outcomes with each other.

As a result, while the development of England's mandatory BNG scheme benefitted greatly from this policy-based period, it was subsequently taken through the English government's legislative process, which took several years to achieve. More on the role that early voluntary adoption played is found in the 'Establishing Central Governance' section.

Globally, a policy-based approach that allows for more flexibility is generally more common within biodiversity compensation schemes. For example, in Canada the Fisheries Act requires there to be No Net Loss of important fish habitats from different types of development, but how this is achieved is not set out in great detail within the Act itself. This has led to Canada's central government setting up a process that requires companies to compensate for any damage or loss. However, this is taken forward on a case-by-case basis and often involves bespoke compensation agreements. In comparison, the US biodiversity compensation schemes for wetlands, streams and protected species were radically changed in 2008 when legislation was introduced to make compensation assessed and enforced in a standardised way.



Lessons learned

- It may be useful to first introduce a BNG scheme on a voluntary basis, depending on the stage of policy development and scale of impact you are aiming to deliver.⁴ This basis can then be used to transition to a mandatory approach that can deliver higher degree of consistency and align efforts with countries' NBSAPs.

- **Net Gain, beyond No Net Loss**

It was decided that aiming for No Net Loss was not a sufficiently ambitious position, and a 10% requirement was taken ultimately based on the balance between impact on property developers' financial viability versus the need to address the scale of their impact.

Some also consider the 10% Net Gain requirement to be a useful 'buffer' for No Net Loss, given the various delivery challenges that can arise during implementation.

Some LPAs have adopted greater than 10% requirements within their jurisdiction, where they can prove that there is an ecological need for this and that it would not greatly affect the financial viability of development plans.

⁴ For further guidance on this point, we recommend BBOP's Offset Design Handbook (Steps 1 and 2 respectively).

An example of England of an LPA targeting more than 10% BNG is Cambridge County Council, which is targeting 20%. Further LPAs are considering +10% targets in their Local Plans, but are required to show that there is a local need for a higher percentage and assess any impacts on viability of development.^{4b}

Globally, some stakeholders have advocated for a Targets Based Ecological Compensation approach, which involves setting targets for compensation relative to the regional or national environmental policies in place for the habitats in question. This approach was first proposed in 2018.⁵



Lessons learned

- Due to the scale of global biodiversity loss and the potential issues that can arise from delivering long-term biodiversity gains, it is generally preferable to aim for a Net Gain within compensation models. However, the quantification of targets needs to be considered in both the ecological and socio-economic context in which the scheme will operate.
- More dynamic target setting, such as the Targets Based Ecological Compensation approach, may be more useful for those that wish to tailor targets of different habitat and species recovery within the compensation scheme.

• Preserving local levels of nature

England's government decided to design the BNG model so that local levels of nature would not be greatly skewed or affected by use of off-site compensation. Specifically, that property developers would not rely on off-site compensation options far away from the development site, causing further imbalances across the country between highly developed areas and places of nature.

This is aligned with one of England's policy ambitions of "connecting people with the environment to improve health and wellbeing".⁶ In England, public access to nature is seen as an important social and cultural consideration.

Within the BNG model, this is delivered partly through the mitigation hierarchy (see above), which prioritises on-site gains first, but also the spatial risk multiplier within the metric that disincentivises property developers from purchasing units from off-site providers located further away (see *Developing a Biodiversity Metric*). Together, these two features support what is termed by some as the proximity principle.⁷

^{4b} Ministry of Housing, Communities and Local Government. "[Guidance: Biodiversity Net Gain](#)". May 2024."

⁵ For an overview of the Targets Based Ecological Compensation approach, we recommend the following webinar: "[From biodiversity offsets to target-based compensation](#)", hosted by BBOP on October 2018.

⁶ Defra. "[25 Year Environmental Improvement Plan](#)". 2023

⁷ UK Green Buildings Council. "[The Proximity Principle, on-site and off-site measures](#)." May 2023



Policy, legislation and the role of central government

A system for BNG can be established at the national, regional, or even local level, with roles of governance distributed accordingly. However, some elements of designing and implementing the system will naturally fall to central bodies – such as government departments, regulators or industry bodies - that hold key responsibilities and powers. For example, designing the rules and incentives that motivate wider actors to participate will likely be led by a central governance role.

England's BNG is implemented at the national level and has legislative backing to make it mandatory. The role of central government is therefore fundamental in BNG's design and its ongoing central governance. The role of local governance actors – while heavily linked to central government – is analysed in the next section.

This section sets out how the role of central governance is carried out in England's BNG – including the role of key government departments – how policy or change levers were available to them in designing BNG and the key attributes of the central governance as it stands today, including lessons learned from the policy's development and comparisons with international biodiversity compensation models. For ease, we have highlighted key takeaways from this section below.

Key takeaways:

- England's central governance is driven by **central government departments** – including the Department for Environment and the government's official Environmental Advisor.
- England's BNG model was based on years of **previous policy work**, and used core principles that aligned with the **social, political and economic priorities** of the time.
- The value of **early public engagement** – particularly through pilots – allowed England to pivot from a more general concept of biodiversity offsetting to Biodiversity Net Gain.
- England used **legislation** to make BNG mandatory, but this was preceded by a 10-year period of a less robust (but more flexible) **policy approach** that encouraged early adoption.
- England's government conducted **a cost-benefit analysis** of mandatory BNG and found that the social and environmental benefits far outweighed the costs to government.
- Along with ownership of the overall policy, its monitoring and evaluation, England's central government has taken some roles in the off-site unit market, such as the provision of:
 - An **off-site register** that records where off-site compensation sites are legally secured.
 - A **central 'last resort' fund** for property developers to purchase credits, priced above local market prices to avoid undercutting the provision of local compensation.

Overview of BNG's central government roles

It is useful to first outline the role of central government in BNG's implementation today. Key organisations include:

The Department for Environment, Food & Rural Affairs (Defra)

(equivalent to a Ministry of Environment)

Defra is the official policy owner of BNG. It led the design of statutory BNG and now oversees the BNG system in line with statutory requirements.

On an ongoing basis, Defra:

- produces specific guidance to stakeholders – including property developers, LPAs, and off-site providers,
- manages the statutory biodiversity metric,
- assesses and designates Responsible Bodies (a type of local governance actor in BNG),
- sets and reviews the prices of the 'last resort' statutory credit programme and deploys any resulting funds to biodiversity projects, and
- is in charge of ongoing monitoring and evaluation of the policy.

Natural England

(a public body acting as the government's adviser for England's natural environment)

Natural England helps government departments (such as Defra and the Ministry of Housing, Communities and Local Government (MHCLG)) make decisions on policy and practice where it relates to the environment.

Natural England:

- manages the public register where compensation sites and their gains are recorded and allocated to developments,
- sells 'last resort' statutory credits – a role delegated by Defra,
- puts forward official recommendations to Defra on changes to the metric, at statutory review points,
- gathers and captures data for Defra's monitoring and evaluation strategy.

While Defra owns the statutory BNG policy, Natural England played a large role in the evolution and design of statutory BNG – including the statutory metric's development. It often co-leads stakeholder consultations with Defra.

The Ministry of Housing, Communities and Local Government (MHCLG)

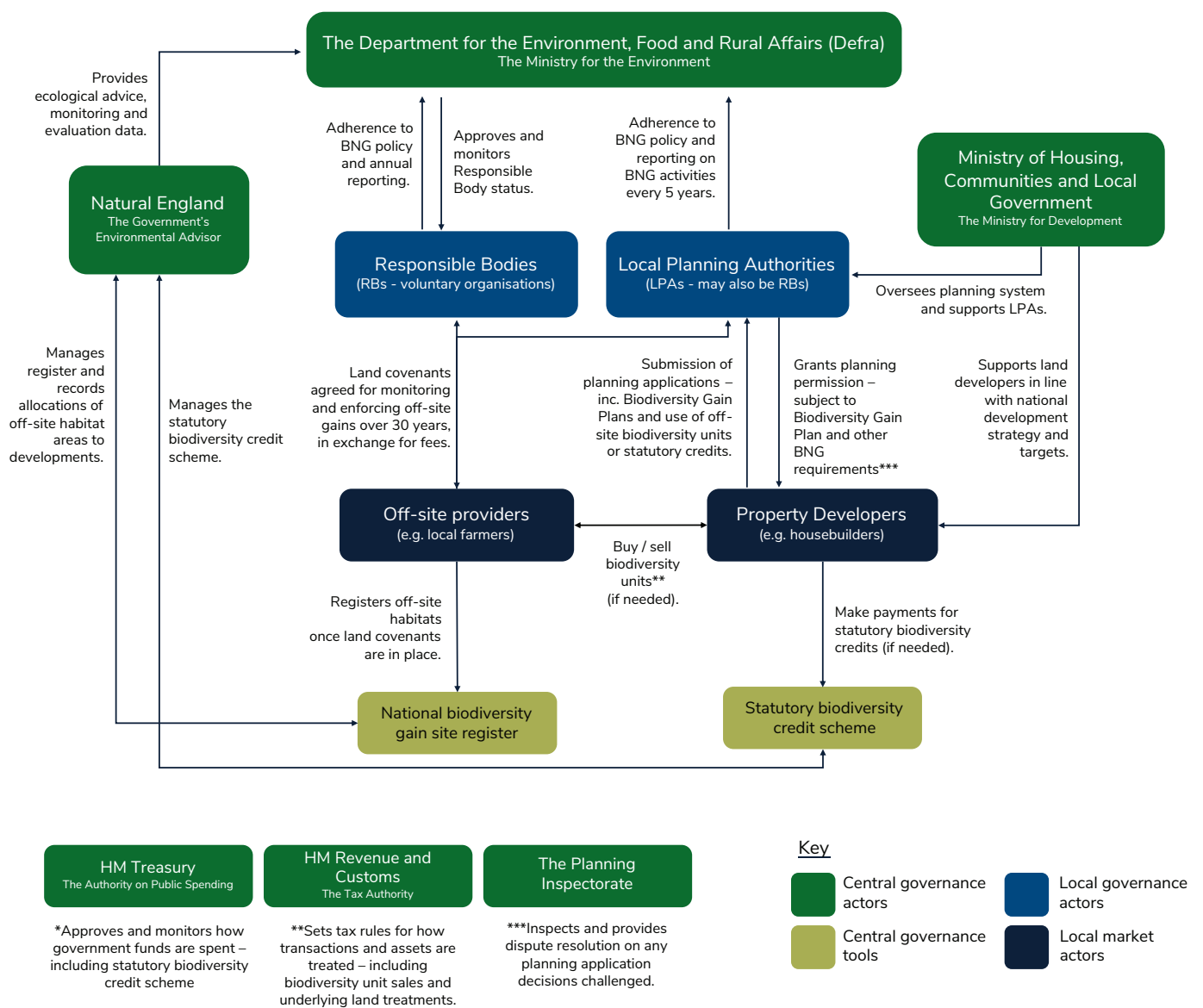
MHCLG:

- oversees the function of the planning system – including how BNG is integrated and delivered through the planning system,
- gives planning guidance to LPAs and property developers on how to meet their statutory BNG obligations.

Other central governance actors involved in the governance of BNG are:

- **HM Treasury**, which manages the UK’s public spending, including how statutory credit funds are spent (as a source of public money) – and;
- **HM Revenue and Customs**, which is the UK’s tax authority and works with the Treasury to develop tax policy.
- **The Planning Inspectorate** – which deals with appeals on planning decisions, and examines local plans prepared by LPAs. The Planning Inspectorate has been trained on assessing BNG decisions and the statutory biodiversity metric itself.

Figure 3: Central Governance Structure of England’s BNG Model



Establishing sufficient inter-governmental resource for England's BNG was a challenge. Capacity constraints and other policy priorities limited the resource available in some core departmental teams which were relied upon to develop appropriate legislation relating to the planning system.



Lessons learned

- Compliance-based schemes require the early and resourced participation of core government departments/ministries.

Key levers or instruments for central government

Building on the early policy work on BNG, proponents of the scheme's development understood that necessary attributes would be:

- delivery through the planning system,
- a mandatory requirement for property developers across England,
- a guarantee of permanence for any measures,
- the ability to compensate for harm through off-site provision – adhering to the mitigation hierarchy.

From this understanding, several different instruments were used over a period of 10-15 years to build out BNG's central governance structure as it stands today.

Use of policy and legislation to establish BNG activities

The next two sections set out how the English government uses both planning policy and legislation to underpin the BNG model and its activities. Planning policy was used for a number of years by voluntary LPAs and organisations, before legislation – the Environment Act (2021) – made it mandatory from February 2024.

Planning policy for enabling voluntary BNG

Planning policy in England is used by central government departments (led by MHCLG) to set the standards and expectations for development proposals. It aims to guide decision-making at local and national levels, and help balance different spatial needs and planning priorities. As such, planning policy was seen as a natural and inherent instrument to help develop and govern England's BNG system.

The first major development for BNG in planning policy was in 2012, where the National Planning Policy Framework (NPPF) was published. The NPPF included the first use of the term "net gain", stating "the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible" (MHCLG, 2012).

In 2018, the wording of the NPPF was strengthened to include the high level concept of biodiversity offsetting, and drop the wording of pursuing BNG "where possible", which was considered by many to be too ambiguous for LPAs to fully embed BNG within their planning systems.

The NPPF gave LPAs a justification to explore their own versions of BNG and required property developers to deliver according to their rules.

Early adopters of BNG provided significant insight into the creation of mandatory BNG policy. For example, some LPAs that tried to implement their own mandatory BNG policies were challenged by property developers on the basis that it would significantly diminish the developments' financial viability'. This encouraged central government to make BNG mandatory, to provide a consistent operating landscape for developers (see *Working with the Demand Side*).

Another example was the different types of metrics that were being created, such as Warwickshire County Council's Biodiversity Impact Assessment. This included key features such as specialist calculations for hedgerows and habitat scoring on distinctiveness, both of which were taken forward in Natural England's metric explorations (see *Developing a Biodiversity Metric*). Importantly, it also showed how the metric could be applied through planning policy, such as the practicalities of asking for metric calculations from property developers within the planning system.

Globally, biodiversity compensation is often built into planning permission, permitting and licensing systems. For example, in France, offsets can be required within projects that impact upon aquatic habitats and wetlands, marine habitats, forested areas and wildlife corridors, but also for projects at high risk of chemical hazards, and for projects in or near Natura 2000 sites projects that could impact protected species.

Lessons learned

- Planning policy and other 'lighter touch' policy methods can be used to incentivise early adoption and experimentation of a BNG scheme.

Legislation for compliance-based BNG

However, Local Planning Authorities were given some discretion in how they use BNG within the NPPF and, ultimately, planning policy frameworks were viewed as too weak an instrument to make BNG mandatory. BNG's mandatory nature was acknowledged as vital to achieving large enough scale to address the decline of biodiversity in England that is driven by development, and ensure a level playing field between LPAs and property developers across the country.

Proponents of BNG – including policy teams in Natural England and Defra – began scoping for legislative change with planning lawyers and other experts. Relevant pieces of existing legislation included:

- the Town and Country Planning Act (TCPA, 1990), which controls the process and requirements of property developers in the planning system.
- the Natural Environment and Rural Communities Act (NERC, 2006), which related to the requirements of Local Planning Authorities to monitor and report on biodiversity levels.

New legislation was needed to introduce the statutory requirements and attributes supporting England's BNG scheme, using new legislation to amend the TCPA and build BNG into existing planning legislation and processes. The government officially committed to make BNG mandatory in 2019 as part of the upcoming Environment Bill.⁸

This decision came after Defra's official public consultation in 2018, which showed that 78% of respondents supported mandatory BNG, although it highlighted some concerns such as LPA capacity.

⁸ In England, new legislation is first proposed as a Bill in Parliament and becomes an Act once it has been approved by both Houses of Parliament and receives Royal Assent from the Sovereign. There is no set time limit for this process.

The Environment Act (2021) requires all major and small site property developers to measure and deliver a 10% net gain on biodiversity compared with the pre-development value (with some exemptions – see *Working with the Demand Side*), offering the ability to purchase biodiversity units (offsets) when adhering to the mitigation hierarchy.

It also contains a number of other features that support central government's role in BNG, creating:

- the biodiversity gain site register, managed by Natural England,
- the statutory biodiversity credits programme, managed by Defra,
- Responsible Bodies and conservation covenants.

The progress of the Environment Act through England's legislative system was protracted, with multiple versions, debates and review stages. This carried elements of political risk - some key attributes of BNG were seen by some stakeholders to be weakened while others were improved with further debate. Overall, it took nearly three years to pass the Environment Act, with secondary legislation⁹ provided after by the Defra and the MHCLG.¹⁰



Lessons learned

- Underpin the core BNG model with appropriate policy instruments – such as policy, regulation, and tax incentives.
- Conduct public consultations or other stakeholder participation activities in creating drivers for legislation.

Use of centralised structures with market operations

The next two sections look at the specific structures that England's central government set up to have a more direct role in the BNG model – specifically its central off-site register and its 'last resort' credit scheme offered to property developers.

Use of a Central Register for Transparency

Central and public registers for recording biodiversity losses and gains are vital for market-based biodiversity schemes - both compliance and voluntary based. They are typically used for market transparency, and to prevent the double counting and selling of compensation outcomes.

If displaying enough information, registers can also encourage public scrutiny of the projects and transactions recorded. This can disincentivise actors from sub-optimal behaviour, such as proposing unrealistic habitat plans that maximise the calculated biodiversity outcomes.

In England's case, the need for a central register for recording 'off-site' compensation gains was acknowledged early on in the policy's development, with policymakers assessing the role of other regional or national registers like the BushBroker® system in Victoria, Australia, and the RIBITs register in the United States.¹¹

⁹ England's legislative system also allows for the creation of 'primary legislation' – which is law passed by Parliament, and 'secondary legislation', which is law created by government departments and expands on primary legislation.

¹⁰ Though some protracted debate within Parliament was focused on BNG, there was also debate and amendments relating to other parts of the Environment Act that contributed to this overall period.

¹¹ For further examples of biodiversity compensation schemes around the world that use public registers, this Guidebook recommends [Credible Biodiversity Offsetting Needs Public National Registers to Confirm No Net Loss.](#), Kujala et al, 2024.

Defra and Natural England decided to create a new register specifically for displaying compensation habitats. Some key features of the off-site compensation register include:

- Only allowing sites that have been secured with a land covenant for 30 years, which ensures developments cannot access these off-site biodiversity gains until they have legal permanence.
- Using hectares of habitat area to show how developments have been allocated, rather than the number of units. This is due to the complications with assigning units publicly, when accounting differences can arise due to the time and spatial unit multipliers within the metric (see *Developing a Biodiversity Metric* for more detail). This led Natural England to choose hectares (area) as a fixed and physical measure to show how double counting is avoided.
- Not acting as a marketplace platform. Defra and Natural England have publicly stated that, due to the core purpose of the register and government's role within BNG, the register would not be designed to promote or match local supply and demand of off-site biodiversity outcomes, and that matching platforms and exchanges would be best taken forward by market stakeholders. In response to this, there have been a number of brokering marketplace platforms set up by different organisations, including eNGOs, local municipalities and private sector companies.

Natural England launched the biodiversity gain site register ('the register') in February 2024, when mandatory BNG policy was first launched for major developers. The specific wording in the Environment Act did not allow Natural England to open the register until launch. This limited the government's ability to assess the ready supply at the point of launch, which they partially mitigated through market feedback.

As of 16 October 2024, the register displays information on 11 different sites totalling 326 hectares.¹² Some stakeholders have highlighted that this falls considerably short of the government's expected targets of 6,000 hectares per year¹³, but acknowledge that the policy is still in its early stages.¹⁴

For each compensation site, the register provides a PDF of the boundary and separate lists of the baseline and planned habitat improvement areas. It also includes details on what developments the site's habitats have been allocated to. There have been calls by stakeholders – such as ecologists and academics – to include more information, such as a geographic breakdown of where the parcels of habitat (both baseline and planned) are located within the boundary. Defra and Natural England are taking this under advisement and are iterating on the register's design and function.

England's central government did not decide to create an equivalent register for 'on-site' gains – where property developers create or enhance habitats on the site of development in line with the mitigation hierarchy. For data collection, it has instead built this information into the existing national planning data system. However, the accessibility of information on BNG within this system is extremely limited, and BNG stakeholders have called for parity between the way on-site and off-site gains are recorded and made public.

¹² Defra. "[Biodiversity Gain Sites Register](#). Last accessed 18 September 2024.

¹³ Defra. "[Biodiversity Net Gain: Market Analysis Study](#)." February 2021.

¹⁴ Though the overall reason for this slower uptake has not been confirmed, anecdotally it is said that there are supply-side bottlenecks with the signing of land covenants, which can take several months to finalise due to untested legal agreements and limited capacity of local governance actors.



Lessons learned

- It is important to launch a central register ahead of full implementation, so that any logistical issues are worked through and there is ready supply and/or demand access.
- Work closely with academics, ecologists and target user groups to ensure the register records and displays information to a degree that allows for the information to be clearly understood, facilitating public scrutiny and transparency.
- Set equal standards for both developer-led and off-site compensation, including how planned and secured habitat uplift is recorded and publicised.
- Consider how supply and demand can be appropriately matched, such as unit offerings of different sizes and locations, either by centralised structures or by market actors.

Use of a central credit scheme for 'last resort' market capacity

Where market-based mechanisms are used to offer off-site compensation, a central governance actor (such as a government organisation or industry body) may decide to offer a centrally managed scheme for property developers (or the equivalent demand-side actor) to purchase credits or units.

As BNG is a compliance-based mechanism in England, where property developers may be unable to proceed with development until they meet the 10% BNG requirement, central government considered it prudent to create such a scheme. This was designed as a 'last resort' option that would prevent viable development plans from being blocked if they could not find local off-site compensation. The creation of this 'statutory biodiversity credits scheme' was written into the Environment Act in order to give it a statutory basis.

However, central government did not want this scheme to be relied on excessively by property developers, who are encouraged instead to seek out local compensation sites in line with the proximity principle. To disincentivise such behaviour, England's 'statutory biodiversity credit scheme' has three key features:

- Statutory credits are worth 0.5x biodiversity units, which are offered by the market. This is in line with the metric's spatial risk multiplier (see *Developing a Biodiversity Metric*), to reflect the fact that property developers' funds may not be deployed to compensation sites near the point of impact.
- Statutory credits are offered at prices significantly higher than the market rate of biodiversity units. These prices are reviewed by Defra every six months, with any changes announced 10 weeks ahead of time.
- Property developers must seek the permission of their LPA to purchase statutory biodiversity credits, showing why this cannot be met with either on-site mitigation or local off-site compensation solutions. For example, property developers may need to purchase fractional biodiversity units (such as 0.1 biodiversity unit) that local off-site providers are not willing to provide due to transaction costs.

Defra is charged with deploying the funds, which are ringfenced for the purpose of improving biodiversity by the Environment Act. However, there is no requirement for the funds to be spent on the same type of habitat that was impacted by the development or be located nearby as with market off-site units. There is also no fixed timeframe by which these funds must be deployed. Defra is legally required to report on income from the sale of statutory biodiversity credits, and how this income has been spent, with the first report due in February 2025.

As of October 2024, Defra and Natural England have been developing their approach to spending income from the sales of statutory biodiversity credits since 2020, but have not yet been able to identify a mechanism that is legal and consistent with, for example, the rules of HM Treasury that manages the funds as public money until they are spent.

England's statutory biodiversity credit scheme can be compared to the In Lieu Fee (ILF) programmes of the US compensation schemes for wetlands, streams and endangered species. In the US, ILF programmes are compensation funds managed by non-profit organisations or government entities. They can sell mitigation credits to permittees ahead of offsets being established, and are given three years to deploy the funds. Historically, some ILF programmes in the US have been found to have delivery issues, such as insufficient pricing of offsets and failure to source land for offset activities.



Lessons learned

For the creation of a centralised fund to manage some or all compensation payments, consideration should be given to:

- How access to the fund is granted as a 'last resort' option to different levels of demand-side actors, such as developers of different sizes and financial viability.
- How the fund, either directly or indirectly, incentivises off-site compensation to take place in line with the wider scheme's core principles – such as spatial proximity within England.
- How quickly the funds can be deployed into biodiversity projects, so that the time between impact and compensation is limited.
- What transparency is offered to the wider market in terms of how, where and when the funds are spent.
- How the fund's spending will be compliant with overarching procurement and financial management rules under which the fund manager's authority falls.

Building the business case for mandatory BNG

Below sets out some key components of how the English government developed its business case for BNG. This includes its early work that established the basis of BNG, the development of a Monitoring and Evaluation Strategy, and the assessment of the model's cost-effectiveness.

Early policies and mechanisms supporting BNG's creation

This section summarises some key features of the BNG model's early development, primarily covering events between 2002 and 2014.

- **Early policy documents.** The origins of BNG policy development can be traced back as early as 2002, when early policies like Defra's "Working with the Grain of Nature" promoted biodiversity consideration in construction, planning, and development.
- **Recognition of the planning system as an instrument.** Initiatives like the Planning Policy Statements (2005), the NERC Act (2006), and the National Planning and Policy Framework (2012) all laid the groundwork for placing the responsibility to protect biodiversity in England's planning system.
- **Quantified biodiversity loss from development.** Land use change statistics, coupled with studies on the cumulative losses of species decline, priority habitat and other environmental indicators suggested that development was a significant driver of national biodiversity loss that should be addressed.

- **Exploring market-based mechanisms.** From 2008, the English government explored market-based biodiversity protection approaches, including biodiversity offsets and the creation of a biodiversity metric. One business-led taskforce, convened by Natural England, made biodiversity offsetting their number one recommendation in 2013.
- **Alignment with political priorities.** Ministerial support was critical for exploring biodiversity offsetting at an early stage, which later evolved to a BNG concept. BNG policy was framed as aligned with economic growth, conservation efforts, and the government's green market expansion, which helped garner political support. Alternatives, such as a biodiversity tax or levy, were considered but deemed less suitable than a market-based approach, due to a range of factors likely including political and institutional preference
- **Biodiversity offsetting pilots.** Defra launched a pilot programme from 2012-2014 to test biodiversity offsetting across six regions in England, including the use of the first biodiversity metric. Participants found that voluntary systems would be inadequate. There was also significant concern that the scheme could become a 'licence to trash', if further restrictions were not put in place.
- **Public stakeholder engagement.** Public consultations and stakeholder engagement from 2010 onwards helped refine the policy, despite initial resistance to biodiversity offsetting as a concept. Key outcomes included the use of the mitigation hierarchy.
- **International policy backdrop.** Global policies during this time, such as the Aichi Targets of the Convention on Biological Diversity (2010), the UN 2030 Sustainable Development Agenda, and the IUCN Policy on Biodiversity Offsets (2016) also contributed to England's momentum for biodiversity policy development.¹⁵



Lessons learned

- Conduct a review of pre-existing policies to help determine the potential scope of a compliance-based BNG model – including what activities and types of land use to target.
- This includes legislation, policy frameworks and environmental strategies, so that the scope builds on previous understanding of environmental impact and where responsibilities should lie.
- Conduct a spatial assessment early on of both historic and expected impact on biodiversity, ideally over a prolonged period of 20-30 years, to create a driver of policy development. The assessment should be linked to the relevant NBSAP.
- Align the BNG scheme with the overall economic and political priorities of the region, in order to create more political and social support for its implementation.
- Early stakeholder engagement is encouraged on the core principles of a biodiversity compensation scheme, particularly in relation to Indigenous Peoples and Local Communities (IPLC).
- Early pilots may be used to test the mechanics of a potential scheme and assess stakeholder perception and adherence to this scheme.

¹⁵ While not a policy, it should be noted that the work of the Business and Biodiversity Offsets Programme (BBOP) from 2004-2018 was a critical piece of work that drew upon the learnings of other countries and regions for England to reflect on. We recommend that those interested in developing BNG schemes refer to BBOP's body of work, which are included within the references of this Guidebook.

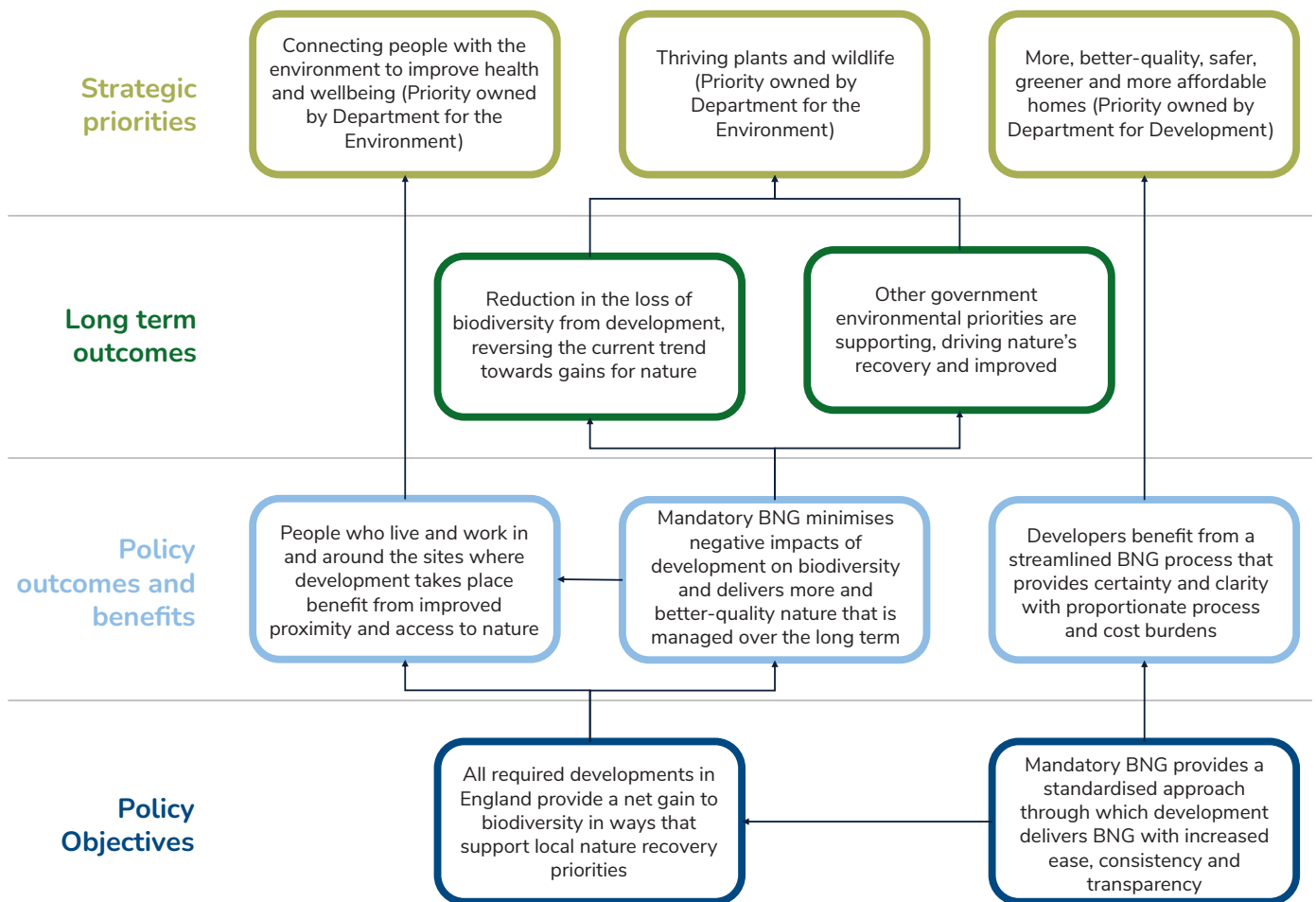
Establishing a monitoring and evaluation strategy

Central governance of a BNG scheme must also cover its monitoring and evaluation. It may be advisable to create a strategy that covers the monitoring and evaluation of:

- the process – how effectively the scheme is being carried out
- the impact – to what extent the scheme is leading to the target biodiversity outcomes
- value for money – whether it is cost effective to deliver the overall scheme

It is also crucial that the monitoring and evaluation strategy ties with the Theory of Change that is being proposed by the scheme developers. England’s high-level Theory of Change for BNG is linked to three overarching policies and is set out below:

Figure 4: The government’s stated objectives, outcomes and benefits for statutory BNG



Source: National Audit Office (NAO), 2024

Natural England commissioned an initial BNG Policy Evaluation Plan for 2023-2025, which contains a fuller description of the Theory of Change and proposes how this would be integrated into the evaluation plan.¹⁶

However, as of October 2024, Defra and Natural England are developing their full Monitoring and Evaluation Strategy in regard to statutory BNG. Their focus is to improve existing data sources, such as the data requirements of the off-site register and local governance reporting, rather than setting up additional monitoring systems.



Lessons learned

- While the full monitoring and evaluation strategy of a BNG scheme is – to some extent - dependent on the scope of the scheme and its governance, developers of prospective BNG schemes should spend time on the Monitoring and Evaluation strategy early on.
 - For example, choosing the Key Performance Indicators to measure against the target outcomes will ensure that data feeds (both on market and ecological data) can be clearly established within central systems – including registers and reporting requirements.
- A monitoring and evaluation strategy should also be designed to detect any unintended consequences of the policy. For example, in England there have been calls to measure the degree to which BNG policy is streamlined and not disproportionately burdening property developers in the planning system.

Estimating value for money

In 2019, Defra conducted an ‘impact assessment’ that concluded the value of benefits of the mandatory BNG being proposed would be far greater than its cost to government.

The key finding from this assessment was that the value of net benefits would be £9.6bn over a 10-year period (2021-2030), in 2017 prices. This estimate included “natural capital” benefits, encompassing elements such as wellbeing and quality of life, valued at £1.4bn a year.¹⁷

Stakeholders comment that the impact assessment was one of the first national policies to quantify significant biodiversity/nature benefits, albeit in a basic way. This was significant in terms of getting agreement to the policy, as it showed a very high benefits-to-cost ratio for a government project.¹⁸

In 2022, Defra’s assessment of the costs was reviewed and approved by the government’s accounting division as likely to be good value for money. This business case included a budget of £10 million annually to provide local authorities with new burdens funding until 2032 (see *Establishing Local Governance* below). Defra expects elements of mandatory BNG to be cost-neutral in the long term.

Looking forward, Natural England intends to conduct a value-for-money evaluation as part of its policy evaluation, to be published in 2025 (see *below for more detail*). This will seek to establish whether the implementation of mandatory BNG is providing biodiversity gains in a cost-effective way. However, it recognises the actual environmental and social benefits will be difficult to quantify and monetise.

¹⁶ Natural England. “[Biodiversity Net Gain: Policy Evaluation Plan for 2023/2025](#)”. 2023.

¹⁷ National Audit Office (NAO). “[Implementing Statutory Biodiversity Net Gain - NAO Report](#).” May 17, 2024.

¹⁸ The 2019 impact assessment was also significant in demonstrating that costs of mandatory BNG to developers would be manageable, with the ability to build BNG costs into underlying land values (see *Working with the Demand Side* for more detail).



Establishing local governance

Depending on the scale and scope of a BNG model, local governance actors that are distinct from central bodies may be given decentralised roles and responsibilities.

For example, local environmental organisations might bring a deeper understanding of local ecosystems, community dynamics and socio-economic contexts that can be applied to how long-term habitat plans are assessed and monitored. Depending on the powers granted to local governance actors, their proximity to affected areas may allow them to tailor their strategies to align with the specific needs of the environment and local stakeholders.

Other national and sub-national biodiversity schemes do not use local governance structures and opt to allocate assessment, monitoring and enforcement roles to central bodies. For example, Canada's Fish Habitat Banking scheme is overseen by the Canadian Government's Department of Fisheries and Oceans (DFO), whose Minister must approve mitigation plans based on policy and guidance.

Within England's BNG model, the two key types of local governance actors are Local Planning Authorities (LPAs) and Responsible Bodies. This section will focus on these two organisations. For ease, we have highlighted key takeaways from this section below.

Key takeaways:

- England opted for a local governance structure that made use of existing planning functions to implement the core functions of **assessment, monitoring and enforcement** of on-site and off-site habitat delivery over the 30-year period.
- **Jurisdictional boundaries** are set between local governance actors, balancing political, administrative and ecological considerations.
- The English government also struck a balance between **standardisation versus allowance of bespoke approaches** that could reflect local communities' priorities.
- Local governance actors use **land covenants** to legally commit the land used in some on-site and all off-site compensation, which keeps the habitat protection in place, regardless of transfer of ownership.¹⁹
- England's BNG model uses **local landscape level planning** to help guide where off-site compensation is best placed.
- The English government set a **two-year transition period** from the passing of the legislation to help prepare local governance actors for their roles.
- Since BNG's launch, there have been calls to provide **further core funding and resources** to local governance actors, and address disparities in the strength of governance between **on-site and off-site compensation**.

¹⁹ In England, these are technically referred to as 'local land charges', but we use the broader term of 'land covenant' in this Guidebook for international comparability.

Overview of local governance actors within England's BNG model

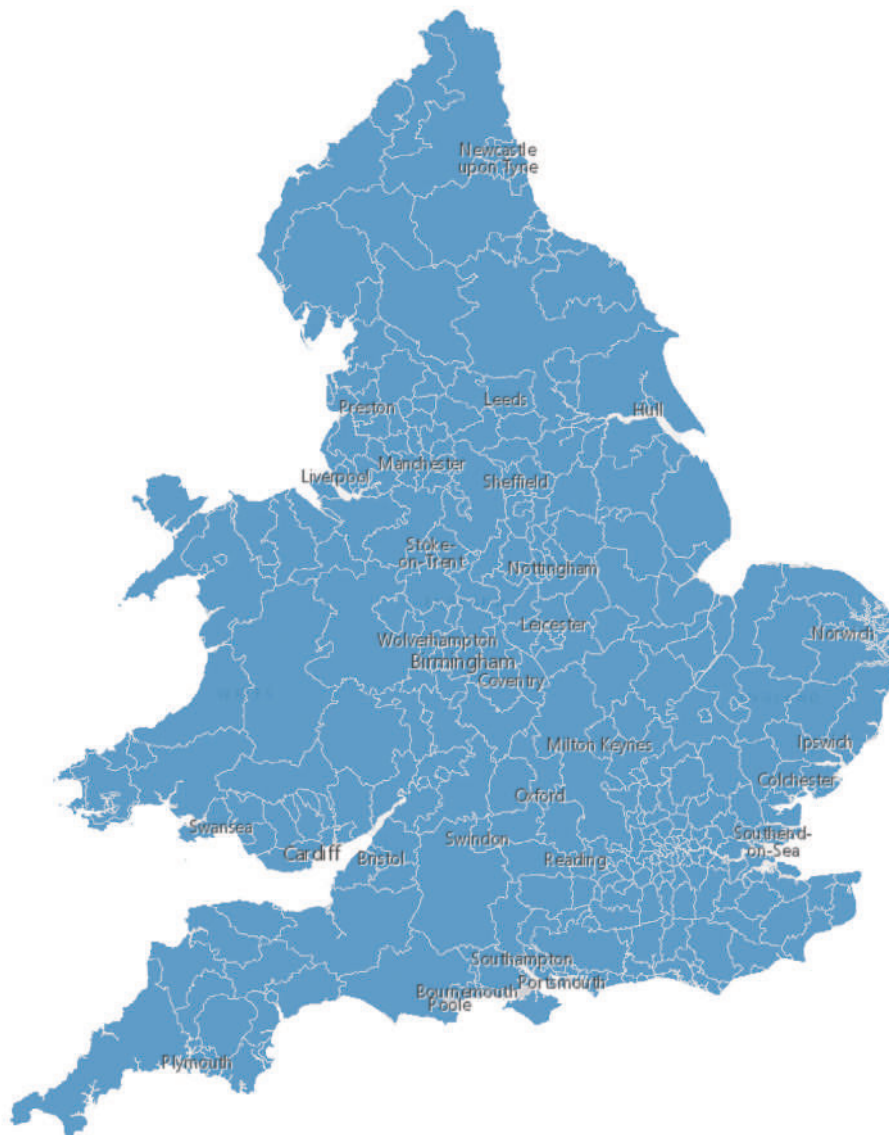
The two key types of local governance actors within England's BNG model are:

- **Local Planning Authorities**

A Local Planning Authority (LPA) is the municipal government body that is empowered by law to oversee the planning system for a particular area, for example by analysing and approving planning applications from property developers. LPAs must consider how to conserve and enhance biodiversity as part of their wider planning role.

LPAs are usually the planning department of a local municipality, such as a district council, borough council, or county council. Other examples of LPAs include the National Park Authorities. There are over 350 LPAs in England, ranging in size from 15 km² – 3300 km²

Figure 5: Map of LPA Jurisdictional Boundaries in England



Source: Office for National Statistics (ONS), 2023

Within England's BNG model, the role of LPAs includes:

- Assessing and approving property developers' plans to meet their BNG obligations (Biodiversity Gain Plans), including the use of off-site compensation where it meets the mitigation hierarchy.
- Acting as the monitor and enforcer of both on-site and off-site BNG habitat delivery, unless a Responsible Body is engaged (see below). This role is typically secured through a Section 106 (S106) agreement, which is a type of land covenant signed between the LPA and the landowner.
- Reporting to Defra every five years on how and where BNG habitats are being delivered in their jurisdiction, both on-site and off-site.

Because of their core role in approving property developers' BNG plans and acting as the monitor and enforcer of BNG habitat delivery, LPAs are often regarded as the BNG market makers of their own jurisdictions.

LPAs receive fixed fees from developers on their overall planning applications (not increased since BNG's implementation). They receive core government funding to account for the increased requirements of assessing planning applications. They are also able to set and charge their own fees when offering S106 agreements to on-site and off-site BNG providers.

- **Responsible Bodies**

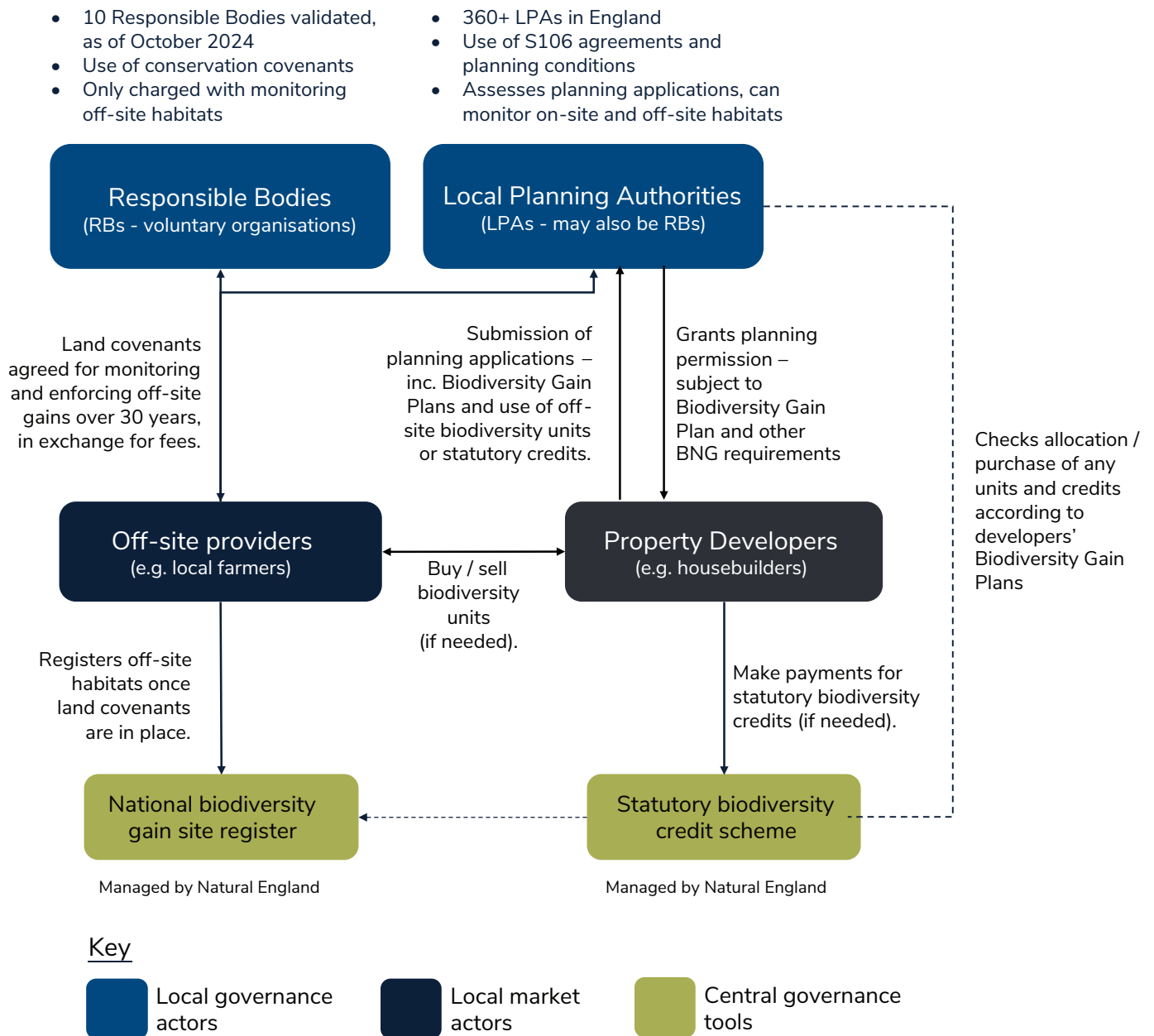
Responsible Bodies (RBs) are a new type of organisation introduced by England's Environment Act (2021). As of October 2024, there are 10 RBs.

In the context of BNG, their core responsibilities are:

- Acting as the monitor and enforcer of off-site BNG habitat delivery, unless an LPA is engaged (see above). This role is secured through a conservation covenant, which is a type of land covenant signed between the RB and the landowner.
- Reporting to central government (Defra) every year on how and where BNG habitats that they are monitoring are being delivered.

RBs can be local authorities, environmental charities or private companies, where their core activities relate to ecological conservation. They must apply to Defra to become an RB before offering any services. RBs are able to set their own fees when offering conservation covenants to prospective off-site BNG providers.

Figure 6: Local Governance Structure of England's BNG Model



Why were LPAs and RBs chosen for these roles?

As the scope of England's BNG model is centred on the impact of development and mitigation through the planning system (see *What is England's BNG Model?*), LPAs were identified early on as the appropriate local body to assess how property developers' plans would meet the BNG requirement, as part of the wider planning application process. Embedding property developers' BNG requirement into the planning system was also seen as a key design feature that would make developers' compliance easier and not create excessive burdens through a new system.

In addition, placing this power with LPAs was seen as a useful way of installing democratic aspects within the BNG model, as LPAs are led by locally elected members. LPAs set their own spatial planning priorities (Local Plans) in their jurisdictions, such as how and where further development should be encouraged, and where it should be restricted in line with local ecological priorities. Giving LPAs this discretion in their wider ‘market making’ capacity of BNG was seen as a way to leverage local expertise and minimise potential conflict with other local spatial planning priorities.

Though RBs and conservation covenants were proposed for wider conservation purposes, the role of RBs was introduced into BNG policy development to help alleviate capacity constraints. Stakeholder feedback in early policy development suggested that LPAs may be overwhelmed with requests to sign land covenants with off-site BNG providers, and so there should be an alternative type of organisation to offer such monitoring and enforcement services through a different type of land covenant (conservation covenants).



Lessons learned

- All governance and regulatory aspects of a BNG scheme can be placed with central bodies – such as regulators or government departments – or with a decentralised structure like England’s BNG model, in order to reflect local priorities.
- If relying on local governance, consider how jurisdictional boundaries between local governance actors are drawn. For example, where political and administrative boundaries may be useful to align with organisational systems, versus ecological boundaries that reflect where compensation may be most useful.

Assessment, monitoring and enforcement mechanisms

Effective assessment, monitoring and enforcement is of the utmost importance for the delivery of a successful BNG or other biodiversity compensation model. Without these, schemes run the risk of becoming a ‘box ticking’ exercise that do not examine biodiversity plans for their actual feasibility (assessment), confirm any realised biodiversity outcomes (monitoring) or incentivise those that commit to delivering these (enforcement).

Within England’s BNG model, local governance actors (LPAs and RBs) take on the assessment, monitoring and enforcement.

Overview of mechanisms for BNG’s assessment, monitoring and enforcement:

Within the planning system, LPAs have two legal mechanisms by which to set their requirements of property developers and off-site BNG providers:

- **Planning conditions** (with property developers) – Planning conditions are based within the planning system and are additional requirements of property developers that must be met to lawfully proceed with development. They are often attached to limit and control how the permission to develop is implemented. For example, all LPAs must require developers’ full plans to meet their BNG requirement before they can commence development, through a planning condition known as the ‘biodiversity gain condition’. LPAs are not permitted to charge any fees through planning conditions.

- **S106 agreements** (with property developers and off-site providers) - S106 agreements are a type of planning obligation that have historically been used to mitigate the negative impacts of development on the wider community and environment. In the context of BNG, an S106 agreement is signed with the LPA to secure a site's habitat works and maintenance over 30 years. LPAs can sign S106s to secure BNG units both on-site (for significant enhancements) and off-site. Through the provisions set out in the S106 agreement, an LPA can provide the monitoring, reporting and enforcement functions over the 30- year period and can charge fees to cover the costs of these activities.

Additionally, RBs are given the use of:

- **Conservation covenants** (with off-site providers) - Conservation covenants are offered as an alternative land covenant to S106 agreements and are seen by many as a key tool in relieving pressure on LPAs to sign such agreements. A conservation covenant is an agreement to conserve the natural or heritage features of an area of land. They are voluntary, private and legally binding. The agreement is made between a landholder and designated RB. Like S106 agreements, they secure the land for the required 30 years (in the context of BNG) and allow RBs to provide monitoring, reporting and enforcement functions in exchange for fees charged to the landholder. Conservation covenants are intended to be used in the BNG space but were not solely created for BNG, and can be used more widely for nature and heritage conservation purposes.



Lessons learned

- Particularly for compliance-based biodiversity schemes, assess the existing tools – such as regulatory frameworks and types of legal agreements – that can be repurposed or adapted to fit in the various assessment, monitoring and enforcement needs within a BNG or biodiversity compensation model.
- If none exist, new mechanisms should be created that give local (or central) governance actors the appropriate assessment, monitoring and enforcement powers.

Assessment

LPAs and RBs are tasked with assessing the feasibility of habitat plans that are put forward by developers and off-site BNG providers in their initial proposals. Three key assessment documents include:

- Completed metric calculations – developers and off-site providers must submit full metric calculations, using Defra's statutory biodiversity metric, which show how the number of units have been generated and whether these calculations on future habitat gains are robust, especially in relation to the Habitat Management and Monitoring Plan (see below). Metric calculations are assessed by LPAs when discharging developers' planning conditions and when signing land covenants (S106 agreements and conservation covenants) that secure the land for the full 30 years.
- Habitat Management and Monitoring Plans (HMMPs) – these are documents used by both property developers and off-site BNG providers to set out the plans for creating or restoring the habitat, how the habitat will be maintained, and who will be responsible for both initial works and ongoing maintenance, management and reporting. HMMPs can also build in how management plans might be changed if monitoring reveals the habitat uplift is not progressing as expected. HMMPs are required by both LPAs and RBs before they sign any land covenant (S106s agreements or conservation covenants).

- Biodiversity Gain Plans (BGPs) – BGPs are only required of property developers and serve as a more complete picture of how they will meet their BNG requirement for development to legally proceed. For example, details must be included if bespoke compensation is required (such as with impact on protected habitats), confirmation of any off-site habitats that have been allocated to developers (and therefore not double counted), and proof of purchase if the developer is buying statutory biodiversity credits. LPAs use the ‘biodiversity gain’ planning condition to require developers to submit their full BGP before allowing development to commence.

Central government has provided standardised documents to help local governance actors maintain a minimum standard of assessment. However, LPAs and RBs are reliant on ecological expertise to assess these documents, and some have formed partnerships with eNGOs to assess habitat plans to an adequate extent (without having sufficient ecological expertise in-house). Some LPAs have also required developers and off-site providers to submit further details at the assessment stage that are not required through legislation, such as details on how the funds will be managed to maintain the habitats over the 30-year period.

Lessons learned

- Any governance actor charged with assessing habitat plans must be given sufficient capacity and ecological expertise to do so. Stakeholders might consider how resourced their ecology sectors are and whether there is adequate capacity to have such resource embedded within the relevant governance structure of their BNG scheme.

Monitoring

Monitoring and reporting requirements for developers and off-site BNG providers can be set via S106 agreements, conservation covenants and planning conditions. The government recommends that - at a minimum – habitat monitoring intervals are set at years 1, 5, 10, 20, and 30, gauging the presence and condition of the habitats according to the HMMP. However, more frequent monitoring intervals have been observed in the market.

Currently, there is a lack of consensus on what specific monitoring activities for different habitats are appropriate for LPAs and RBs to undertake over the 30-year period, which in turn affects the fees that are charged to developers and off-site BNG providers through S106 agreements and conservation covenants. Anecdotally, there have been a range of fees quoted that some market stakeholders consider both too low and too high, which is leading people to call for standardised monitoring protocols for specific habitats, such as grasslands and scrub.

Note: LPAs and RBs are also required to report on their own BNG activities, including how much land has been secured for BNG, its extent and condition. For LPAs, this information is required every five years, and for RBs this is required every year.



Lessons learned

- Local governance actors should be equipped with sufficient ecological resources, and guidance or standardisation should be given on relevant ecological monitoring.
- Depending on how the scheme is designed, other types of monitoring may be required, such as financial monitoring.
- Stakeholders considering their own BNG scheme are encouraged to consider what data at the very top level of governance is needed, including what is required to assess the effectiveness of the scheme itself. This should be built into reporting requirements of its local governance actors and any other important data feeds – such as registers.

Enforcement

Many BNG stakeholders have voiced the critical importance of enforceability for both on-site and off-site habitat uplift, including what happens when those responsible for managing the habitat are not seen to be delivering according to their BNG habitat proposals.

In England's BNG, S106 agreements and conservation covenants can include provisions for enforcement. However, the extent to which enforcement can be taken is dependent on:

- The Habitat Management and Monitoring Plan (HMMP) – which sets out exactly what actions are meant to be taken to achieve the target uplift. The responsibility to develop an HMMP sits with the off-site provider, such as the landowner or habitat bank operator, or any service provider they have engaged to help them with this work – such as ecologist.
 - HMMPs should include a risk register that sets out key risks and what steps or remedial actions must be taken in the event the habitat's target uplift is not delivered – such as adaptive management measures against rising temperatures.
- The land covenant (the S106 agreement or conservation covenant) – which sets out enforcement measures and mandates that the HMMP is followed. However, this document does not penalise the off-site provider if the actions set out in the HMMP do not deliver the target uplift, reflecting the various factors in nature that can undermine habitat uplift.
 - Factors like force majeure should be included here, such as extreme weather or ecological changes made upstream.

It is up to the LPA or RB to determine whether best endeavours have been taken by the habitat manager, including how the HMMP has been followed, and to set their own criteria for what enforcement action is taken – in line with their local enforcement plans. These can include fines, repaid funds from unit sales, 'step-in rights' to take possession of the habitats directly, or other punitive measures. In the most severe cases of non-compliance, those responsible could be given up to two years in prison, though this has not taken place yet in England's BNG scheme.

Planning conditions can be used for enforcement of 'non-significant' on-site gains – those habitats whose loss would not materially affect the over BNG value of the development site. Planning conditions do not come with additional funding, unlike S106 agreements or conservation covenants. There has been some criticism on the use of planning conditions to enforce on-site habitat uplift due to the lack of funding and other restrictions.²⁰

²⁰ To enforce planning conditions, LPAs must typically prove that a breach must pose "serious harm to public amenity". Some consider this to be a high bar for BNG delivery that, combined with the lack of resource for enforcement officers, is unlikely to be reached in practice. However, this enforcement mechanism is still being tested by LPAs as mandatory BNG policy is in its early stages.

Overall, LPAs – and to a lesser extent RBs – have called for further guidance on what appropriate enforcement measures can be taken and how. Specific challenges include where there is a change of land ownership, such as where property developers pass on habitat management responsibilities to management companies.

Globally, a lack of robust assessment, monitoring and enforcement mechanisms have been identified as common barriers to delivering realised biodiversity outcomes. For example, a government audit in Victoria, Australia found that the native vegetation offset scheme is not achieving its No Net Loss objective. Causes of this include unauthorised clearing of native vegetation from land with little to no enforcement, inadequate support for Local Government Areas, limitations of biodiversity assessment tools, and insufficient monitoring and reporting by central bodies.²¹



Lessons learned

- For compliance-based schemes, enforcement must be clearly set out through legal or regulatory mechanisms, and governance actors (either local or central) must be given adequate resources and guidance on how to fulfil these roles.
- When considering enforceability, due consideration must be given to how natural habitats can be unpredictable and uncontrollable over the longer-term, and therefore to what extent it is justified to take enforcement action against those responsible for their management. This should be balanced with enforcement to disincentivise improper care of the habitats.
- Ideally, enforcement measures should also build in ways that original habitat management plans can be changed to reflect changing ecological circumstances (adaptive management) over whatever period of time they are being committed for.

Linking BNG to landscape level planning

An overarching landscape plan that sets out where ecological uplift is most valuable can be extremely important within a BNG or biodiversity compensation model.

If well-constructed, it can give demand-side actors, off-site providers and local governance actors a framework to assess the value of and guide where impact and compensation is taking place within a wider ecological context.

The need for such a framework was understood early on within England's BNG policy design. For example, the 2018 public consultation revealed strong support for "habitat opportunity maps" to guide provision of compensatory habitat so that it delivers the greatest benefit. This could be through the creation of habitats with greater connectivity, targeted habitat types for locally valued species, or by incentivising habitat uplift near key waterways.

In response to this stakeholder feedback, and for wider conservation purposes, the English government committed to the creation of Local Nature Recovery Strategies, to be mandated through the Environment Act (2021) along with BNG.

Local Nature Recovery Strategies (LNRSs) are required to be developed and implemented by March 2025. There are 48 responsible authorities across England, each producing their own LNRS. The intention is for the whole of England will be covered by LNRSs with no gaps or overlaps.

²¹ Victorian Auditor General's Office. "[Offsetting Native Vegetation Loss on Private Land](#)". May 2022"

Figure 7: Map of LNRS Areas

Source: Defra, 2023

At a minimum, each LNRS must contain:

- a) a local habitat map that identifies opportunities for habitat uplift and,
- b) a written statement of biodiversity priorities.

Within the BNG model specifically, habitat uplift (both on-site and off-site) that is shown to be aligned with the relevant LNRS receives a 15% uplift through the strategic significance multiplier of the statutory biodiversity metric, meaning that developers or off-site providers will be rewarded with 15% more biodiversity units (see *Developing a Biodiversity Metric*). This is intended to act as an incentive within the BNG model for creating or improving habitats where they have more ecological value.

At the time of BNG becoming mandatory in February 2024, no LNRSs were published and feedback from wider stakeholders was that there should be an appropriate interim measure to guide how the strategic significance multiplier can be used. In response to this, the government introduced an interim level within the strategic significance multiplier that offers a 10% uplift if the habitat uplift has ecological significance. This can be defined using pre-existing frameworks, such as local biodiversity strategies or national priority habitat maps. The relevant LPA has discretion to decide whether the habitat proposal qualifies for the interim measure, and some LPAs have since published their own guidance to show how they make this decision.

LNRs are intended to be used more widely than applying BNG. For example, municipalities must “have regard” for relevant LNRs - this includes LPA’s planning functions, such as preparing Local Plans and determining planning applications. Feedback from LPAs has suggested that there is concern with how LNRs are balanced with other spatial planning priorities, such as where development may be refused if they are impacting LNR areas. There is some concern that public authorities may face challenge – such as a public inquiry – if they are seen to be giving too much or too little weight to LNRs alongside other planning priorities. As of October 2024, Defra is working closely with the Ministry of Housing, Communities and Local Government to develop advice on this.



Lessons learned

- Landscape level planning is extremely important in the design and implementation of a BNG or other biodiversity compensation model. It is important to build on existing ecological strategies, spatial plans, frameworks or other relevant policy documents – including NBSAPs. These can be used to prioritise biodiversity areas and give guidance to stakeholders on where biodiversity impact and compensation may be most acceptable. These can be set at the local level as with England, or the national level.
- If considering the creation of a new landscape plan or framework, aim for this to be made available ahead of full implementation, or introduce interim measures as England did.
- If giving local governance actors the discretion to use landscape plans and frameworks within wider roles, it is encouraged to give clear guidance on how this should be balanced with other spatial or land-use priorities.

Standardised requirements versus bespoke approaches of local governance actors

In designing the above roles and responsibilities of LPAs and RBs, the English government considered how these roles should be standardised, versus where LPAs and RBs can take bespoke approaches and tactics.

Such principles were identified and tested through direct consultations, these addressed a number of topics on the potential variability of local governance, such as how locally designated sites are treated in BNG habitat proposals, the use of additional fees to create local ‘insurance buffer’ funds for habitat creation, or the option for LPAs and RBs to take on additional roles in the BNG off-site unit market. Some examples of the standardisation of LPA and RB roles can be found below:

Must

What LPAs and RBs are legally required to do in a consistent manner:

- Assess BNG proposals of property developers and off-site providers, checking:
 - the robustness of the HMMP and metric calculations,
 - the application of the mitigation hierarchy,
 - legal restrictions of ecologically designated sites and habitats,
 - use of any exemptions (only applies to LPAs)
 - correct use of off-site units or statutory credits, including checking the allocation on national biodiversity gains site register (only applies to LPAs),

- Provide a period of public consultation on planning applications, including property developers' plans to meet BNG requirements (only applies to LPAs)
- Use only planning conditions, S106 agreements and conservation covenants to secure land for the 30-year period,
 - carrying out appropriate monitoring and enforcement of the habitats according to those agreements.

Should

What LPAs are encouraged to do through other policy measures, using their own discretion:

- Set local policies in relation to BNG, including what habitats may be partially rewarded through the Strategic Significance multiplier (only applies to LPAs), or where off-site habitat proposals must meet certain bespoke criteria, such as financial governance checks.
- Agree bespoke habitat compensation where needed, such as where Very High Distinctiveness Habitats cannot be compensated like-for-like (see *Trading Rules in Developing a Biodiversity Metric*) (only applies to LPAs),
- Set monitoring fees via S106 and conservation covenants according to their own cost base and view on appropriate monitoring activities across the 30-year period.
- Provide public guidance on BNG policy and their own approach to how this is delivered locally.

Can

What LPAs and RBs are allowed to do, if they have appetite:

- Work with Local Environmental Records Centres to enhance monitoring capabilities.
- Set greater than 10% BNG requirements of developers (only applies to LPAs).
- Ask for more information in planning applications at an earlier stage (only applies to LPAs).
- Produce and manage local registers of off-site habitat creation, and facilitate matchmaking between property developers and – subject to management of conflicts of interest.
- Use their own land to offer off-site BNG units, though they must find an alternative counterparty to sign the land covenant and manage conflicts of interest accordingly.

Lessons learned

- If considering the use of local governance actors, define their roles with detail and give a clear rationale for doing so, including where specific functions must be standardised for the sake of the model, versus where bespoke approaches can be set.
- Test these local governance 'guardrails' in depth with a representative sample of organisations that are intended to be given such responsibilities.

Preparing local governance actors for their roles

In designing local governance structures, enough time and resource should be given to help the relevant organisations prepare and upskill for their new roles. Thought should also be given as to how learnings and best practices are shared on an ongoing basis.

In England, it was recognised that placing BNG responsibilities within the planning system and LPAs would impose an additional burden on an already complex system. To manage this, LPAs would require:

- Greater ecological expertise within core planning teams.
- Upskilling of wider legal, financial planning, data management, landscape planning, project management and other support functions.
- Stronger and clearer spatial strategies to guide compensatory habitat creation (LNRSs).
- Guidance on BNG from government as well as existing industry bodies.
- Ongoing funding from central government, to deal with the increased responsibility of assessing the BNG aspect within planning applications, which is not covered by fees from planning applications or land covenants that are signed with off-site BNG providers.

Though RBs also require resource and capacity, RBs offer services on a voluntary basis, have a smaller role than LPAs (only serving the off-site component of BNG) and achieve cost recovery through the fees charged with conservation covenants. LPA resourcing and upskilling was therefore considered more a priority for the launch of BNG, with guidance and best practices to be shared with RBs on an ongoing basis.

Estimating resources needed

As BNG introduces new responsibilities to LPAs, Defra was required to undertake a 'new burdens assessment' that would determine how much funding LPAs would need to meet their core responsibilities. This does not include any responsibilities relating to off-site compensation, which is funded through fees charged via land covenants.

In 2022, Defra estimated the needs of LPAs in assessing, monitoring and enforcing property developers' BNG plans – particularly in regard to hiring and training new ecologists. Off the back of its findings, Defra proposed an average annual budget of £10 million to provide LPAs with funding until 2032. This translated to either 0.33 or 0.66 full time equivalent (FTE) ecologists, depending on the volume of expected planning applications within each LPA. It also included 0.2 FTE for monitoring and enforcement of BNG obligations.

In January 2024, Defra was able to confirm that new burdens funding of up to £10.6m - between £26,807-£43,467 per LPA – would be made available up to March 2025.

However, two years prior the Association of Local Government Ecologists (ALGE) published the results of a survey of LPAs (funded by Defra), in which it was survey found that:

- 45% of respondents identified that additional ecologist resource equivalent to 1.0 FTE would be needed to deliver and implement BNG.
- 50% of respondents stated that more capacity equal to or greater than 2.0 FTE would be required to deliver and implement BNG.

Post launch, market sentiment has revealed that most LPAs are seeking further funding and guidance from central government on meeting their statutory BNG requirements. One survey of LPAs, published on the date that BNG became mandatory, found that 68% of LPAs felt they needed more staff and skills, and 41% were uncertain about the ability to access the necessary ecological expertise in the wider job market.

The government has committed to reviewing the needs of LPAs and giving further visibility of core government funding beyond March 2025.



Lessons learned

- Ensure that the resources needed to deliver on governance functions are fully estimated and accounted for in funding structures – either through direct, grant-style funding or through fees and other income streams available to governance actors.
- Provide visibility of such resource early on and, ideally, offer multi-year funding visibility to governance actors to assist with resource planning – such as staff hiring, training and retention.

Providing detailed guidance

Along with funding, it was understood that much more guidance would be needed to equip LPAs with the correct understanding of how to deliver on their roles.

Defra and Natural England made it clear that it would work with relevant industry bodies to create and disseminate this guidance. The major bodies engaged for this work were:

- The Planning Advisory Service (PAS) of the Local Government Association (LGA)
- The Chartered Institute of Ecology and Environmental Management (CIEEM)
- The Institute of Environmental Management and Assessment (IEMA),
- The Royal Town Planning Institute (RTPI)

For example, PAS was engaged directly by Defra to run the overall capacity building programme for the c.360 LPAs in England. PAS was given £300k to liaise with and support LPAs with training and advice on statutory BNG from March 2021 to BNG's full implementation in February 2024. Over this period, it hosted webinars and in-person events, published case studies and online training materials, and produced written guidance on various aspects of LPAs' delivery – including a Readiness Checklist for LPAs to assess their own levels of preparedness for BNG's full launch (PAS, 2024).

PAS also fed back to Defra and Natural England on where the gaps in LPAs' understanding or capabilities. For example, it recommended that legal agreement templates – including S106 agreements and planning conditions – would be highly useful for LPAs in order to ensure minimum standards were captured within initial contracts. Though central government were reluctant to provide set templates, given the variability of how LPAs can fulfil their roles and their legal specifics, it eventually funded the creation of four common legal agreement templates for LPAs. PAS commissioned a law firm and published these in July 2024. This work was well received by LPAs.

Though PAS and other industry bodies produced a wealth of materials that were welcomed by LPAs and wider stakeholders, one drawback of the programme was that the full (secondary) legislation²² was not officially passed until December 2023 – three months before BNG was made mandatory. This meant that the full details of the BNG model, such as how off-site habitats would be recorded on the national register, were not fully confirmed until then. Though it was acknowledged by LPAs and other stakeholders that there was a balance between getting legislation passed and starting to prepare LPAs for their role, this delay in secondary legislation meant that full guidance could not be made available until later on.

²² See Central Governance for more detail on what secondary legislation entails.



Lessons learned

- If choosing a local governance structure, work with industry bodies to upskill and liaise with local governance actors (and wider stakeholders generally), ideally creating a formal capacity-building programme with feedback mechanisms to provide insight on what gaps or challenges there may be with implementation.
- When preparing local governance actors for their role, aim to give visibility over what aspects of the scheme may be under development and when confirmation / further guidance can be expected.

Setting transition periods

Ahead of the Environment Act passing through parliament (2021), central government decided that a transition period would be needed for LPAs and the wider market to prepare for mandatory BNG. A period of two years was decided upon and included within the Environment Act, so that the official date for mandatory BNG would occur two years from the date of the Act's passing. In practice, this launch date was delayed by three months due to logistical difficulties, such as with the launch of the off-site register.

There was strong support for a notice period and clear deadlines within stakeholder engagement, including the official 2018 public consultation. Support for a transition period longer than a year was balanced by concern that too protracted a transition may pose risks to effective implementation and biodiversity outcomes. Two years was decided as an adequate balance between these two concerns.

Within this transition period, Defra offered funding to LPAs to help prepare for mandatory BNG. Funding allocations of either £26,807 or £43,467 were given to each local authority (in line with the new burdens assessment) to prepare within this transition period. 89% of the total funds available were claimed, which could be spent on anything related to statutory BNG preparations, such as recruiting and training ecologists, legal support or new software.

During this period, Defra and Natural England worked with LPAs and wider stakeholders on the specifics of the transition, including what guidance was needed and where secondary legislation may be better informed (see above).



Lessons learned

- If considering a compliance-based BNG model, set a transition period that gives governance actors (local or central) enough time to prepare for their roles, setting clear targets for what should be achieved in this timeframe.
- Ensure that resources are allocated to governance actors ahead of time so that preparations can be made for the full launch of the model.
 - Ideally, offer such resources with an appropriate degree of flexibility, so that the best use of funds can be decided on an organisational level.



Developing a biodiversity metric

A biodiversity metric is crucial for the measurable definition of No Net Loss or Net Gain, driving change within the decision-making process of those with influence over land use.

By quantifying their biodiversity impact, businesses (in England's case – property developers) can take a more robust approach to complying with environmental standards. Where compensatory action is determined necessary, the consistent and transparent use of the same metric by compensation providers (in England's case – land managers), is vital in ensuring the target outcomes adequately meet the impact not avoided or mitigated by the business.

England's biodiversity metric was developed over 10 years and built on the learnings of biodiversity metrics around the world, such as those used by the US wetland mitigation scheme and Victoria, Australia's native vegetation scheme. It was primarily developed by Natural England, with input from environmental experts, government stakeholders, data scientists, land managers and developers. The metric was trialled through five major versions, and was accompanied by several practical pilots and research programmes that collected the missing environmental and market data that was needed to make the metric functional. A second, more simplified metric was also created to be used by small site developers, reflecting their more limited capacity and the smaller areas impacted.

However, creating metrics that capture the vast complexities of biodiversity across different habitats and ecosystems is often a difficult task. It will naturally involve the use of proxies, such as habitat type and quality, which must have a proven link to what biodiversity uplift is being targeted overall, the scope of which must be made clear from the outset.

While complexity is favourable to capture the vastness of biodiversity, socio-economic realities may also force or encourage compromises towards more practical and streamlined metrics for the sake of target user groups. Some public stakeholders may even push back against the use of a metric itself, as there is feeling that measurement may draw away from recognising the intrinsic value of nature overall. For ease, we have highlighted key takeaways from this section below.

Key takeaways:

- England opted for a '**area x quality**' approach for its metric and uses improvements in habitat condition as a proxy for biodiversity uplift.
- The metric is **augmented with multipliers** that incentivise the outcomes that are being sought – such as spatial proximity between impact and compensation, and the delivery of habitats considered more distinct within England's wider ecology.
- The English government released **early versions** of its biodiversity metric from 2012 and used this to draw in wider ecological and market input over a 10-year period.
- The metric uses **trading rules** that dictate how differences in impact and compensation can be set, including the use of **smaller compensation ratios** when lower value habitat is 'traded up' for higher value habitat, and to protect higher value habitat from being 'traded down'.
- The English government created a second, simplified metric for small-site developers to use, reflecting their **more limited capacity**.
- Within its legislative basis, major changes to the metric are now limited to **three-five-year periods**, which provides a level of certainty for the wider market.

Overview of England's Statutory Metric

England's statutory biodiversity metric uses habitat as a proxy for biodiversity and is made up of several components that grade these habitats in ways that measure their worth to biodiversity. The metric distinguishes between three types of units – area, riverine (measured in hectares) and hedgerow (measured in kilometres). Within these three types of units, there are different habitats that are all identified through the UK Habitat Classification System.

Habitats are assessed in initial baselining or surveying, and when plans are drawn up to change the site and its habitats (either on-site or off-site), predictions are made as to how these habitats will change over the 30-year period.

The components used to grade habitats are typically called 'multipliers' that can increase or decrease the number of units that a habitat of a given size generates. These components are:

- **Quality:**
 - The Distinctiveness multiplier – Each habitat type has a pre-assigned level of distinctiveness that reflects how distinct its ecological function and features are from other habitats.
 - The Condition multiplier – The condition of the habitat is assessed when the site is baselined and future condition is predicted / monitored through the 30-year period.
 - The Strategic Significance multiplier – Habitats that are located in areas thought best to deliver biodiversity uplift can also benefit from a strategic significance multiplier. This is determined on a local level.

See *Quality Based Multipliers* below for more detail.

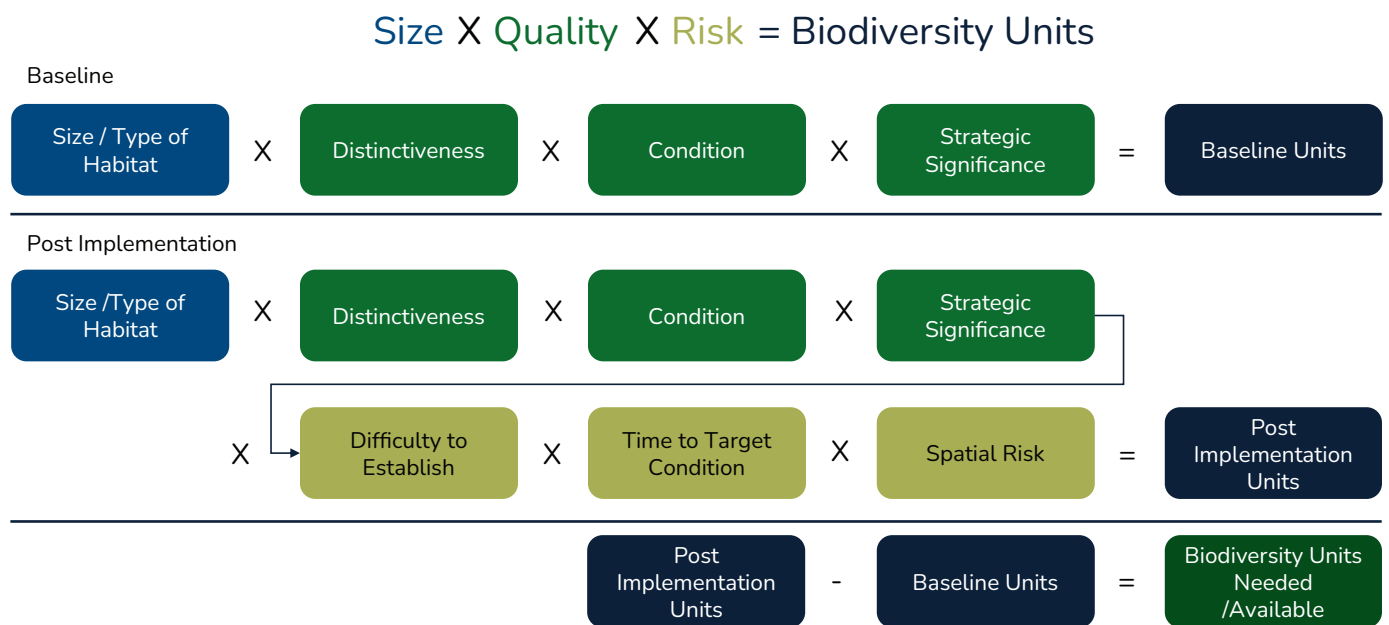
• **Risk:**

Only applied when considering how the habitat will change, the metric uses three risk multipliers to ensure that the predicted habitat changes are reasonably valued:

- The Difficulty to Establish multiplier - how difficult or unreliable the habitat is to establish.
- The Time to Target Condition multiplier - how long the habitat takes to establish.
- The Spatial Risk Multiplier - how far away this habitat is from where the impact is occurring (only applies to off-site habitats that are being used for compensation).

See Risk Based Multipliers below for more detail.

Figure 8: Summary of the Statutory Biodiversity Metric



Source: Patel, EPIC, 2024

Alongside the metric (currently provided as an Excel file) are several linked documents, including the User Guide and a condition assessment template that is used to record the habitat’s baseline condition.²³ Trading rules are also built into the metric, which dictate how habitats of different types and levels of distinctiveness can be compensated or exchanged within the metric (see *Trading Rules* below for more detail).

In theory, the metric’s use is not restricted to those who have specific training or accreditation, but according to the User Guide it must be used by a “competent person [who] has the knowledge and skills to perform specified tasks to complete and review biodiversity metric calculations,”.²⁴ In practice, a number of industry bodies and companies now offer training specifically on the metric, and ecologists that are hired by property developers and off-site providers for the purpose of BNG often include the metric calculations within their habitat baselining and surveying services.²⁵

²³ All of these documents can be found at: ‘[Statutory biodiversity metric tools and guides](#)’. Defra, 2024

²⁴ Defra “[The Statutory Biodiversity Metric User Guide](#).” February 2024.

²⁵ Examples of industry bodies that offer such training include the Chartered Institute of Ecology and Environmental Management (CIEEM), which hosts a range of BNG training courses.

Early establishment of a need for the metric

In England, the need for a biodiversity metric was proposed in a scoping study for the design and use of biodiversity offsets in an English context, which was commissioned in 2009 by Defra.²⁶ The study's findings included a possible metrics framework that proposed core features to explore:

- **Use of habitat as the primary metric** – “this approach has the benefit of reflecting use of land by species and can therefore be used to link consideration of sites and species: sites can be described and measured in terms of their component habitats and species populations can be assessed by reference to the habitats required to support them”
- **Habitat definition & evaluation** – “Habitat parcels can be defined and evaluated in terms of inherent properties (rarity, species composition, species richness...) and in terms of their condition / conservation status (heavily influenced by management).”
- **Measurement of inherent value and condition** – “the inherent value of habitat parcels could be measured with reference to categories in a standard habitat classification).”



Lessons learned

- Broadly speaking, England opted for a ‘area x quality’ approach in designing their metric. Other options include metrics based on measures of area, ecosystem function or direct species population.²⁷

In stakeholder conversations on a possible biodiversity metric, early principles emerged that would directly influence its development. Examples of these early principles include:

- Encouraging proximity between the development and compensation sites – delivered through the spatial risk multiplier of the metric.
- Supporting the creation or restoration of habitat in strategically optimal locations – delivered through the strategic significance multiplier of the metric.
- Recognising the value in larger, lower value areas of habitat being compensated with smaller but higher value areas of habitat (‘trading up’), but not the reverse (‘trading down’) – delivered through the trading rules of the metric.



Lessons learned

- Develop clear principles early on that can guide the metric’s development, and communicate these principles with a wide stakeholder group so that the scope of the metric can be understood early on.
- Evaluate the current scientific evidence base of how the ecological proxies being considered to measure BNG have a strong link to both the residual impact being targeted (such as the impact of development on habitat presence) and the underlying levels of biodiversity (such as the effect of habitat presence on species abundance).

²⁶ [The scoping study](#) was followed by [further guidance](#) published by the same authors in 2010. Natural England started working on the metric’s first official version (Version 1.0) shortly after for use in the [2012 biodiversity offsetting pilots](#).

²⁷ A useful overview of metrics used in biodiversity compensation schemes around the world can be found within [‘What are we measuring? A review of metrics used to describe biodiversity in offsets exchanges’](#). Marshall et al. 2020.

Identifying appropriate ecological classification systems

For metrics based on habitat type, a robust and repeatable habitat classification or typology is essential for baseline surveys and monitoring. Critically, a single habitat classification system allows losses and gains to be compared consistently so that outcomes for habitat extent and condition can be tracked at different geographic scales, for example nationally or within a local plan area.

Early versions of England's biodiversity metric relied on pre-existing habitat classification systems that provided a consistent way of identifying habitats, primarily the JNCC Phase 1 Habitat Classification, which is specific to the UK.²⁸

While this had the advantage of being simple, intuitive and established amongst ecologists, it was felt by stakeholders that a "new, unified and comprehensive system for classifying UK habitats was needed to reflect developments in technology, policy, data management and information exchange," (Butcher et al., 2018). This ask was not solely driven on the development of the biodiversity metric, but a wider call amongst the ecology community in the UK for a more up-to-date system.

Relevant to the biodiversity metric's development, it was proposed that a new and unified classification system could better:

- capture urban and peri-urban habitat types – which are more likely to be impacted by development,
- recognise priority habitats that are supported by environmental policy or other initiatives,
- incorporate assessments of habitat condition,
- reduce miss-classification of habitats by different ecologists in practice,
- perform in digital mapping and management systems,
- complement existing regional and national habitat datasets, allowing for landscape-level assessments.

In response to this wider need, ecologists and relevant industry bodies started to develop the UK Habitat Classification (UKHab) in 2013. The system was then trialled in 2015 and launched in 2018. During this time, Natural England reviewed the potential for UKHab to be used as the underlying classification system for the next trial version of the biodiversity metric (2.0).

UKHab is now used in the statutory biodiversity metric for its habitat classification, including 130 different habitat types. Stakeholders that were part of its development stress that, while the system was not developed for the sole purpose of the biodiversity metric, working closely with Natural England allowed both the metric and the classification system to capture additional value.²⁹

International examples of habitat classification systems include Europe's EUNIS habitat classification, and the IUCN's Global Ecosystem Typology.



Lessons learned

- Assess existing habitat classification systems in relation to the wider model – including the targeted outcomes, the scope of the impact being targeted, and the monitoring and evaluation strategy.
- If transitioning to a new system, ensure there is a translation facility between the old and new classifications.

²⁸ JNCC. "Terrestrial Habitat Classification Schemes". 2019.

²⁹ Part of Europe's EUNIS habitat classification system was added to the metric in 2019 to cover intertidal habitats.

Designing key attributes of the metric

This section sets out the key attributes of England's metric and notes on how they are established in practice.

Baselines scenarios and avoidance of perverse incentives

For both the impact site and any compensation site, it is of paramount importance to establish a clear baseline or reference scenario that users of the metric can start with to calculate the requirement of Net Gain or No Net Loss. How the baseline is calculated should be consistent across both impact and compensation sites, and aligned with ongoing monitoring frameworks.

Lack of clarity or consistency in when the baseline is recorded can lead to users delivering vastly different scales of biodiversity uplift (or in some cases a net loss), without governance actors being able to determine whether or to what extent this has happened. Perverse incentives may also come into play, where actors deliberately degrade the state of their biodiversity in order to benefit from a lower biodiversity baseline – giving them either a lower compliance burden or, in the case of a compensation site, a greater scale of uplift to deliver and monetise.

For England's biodiversity metric, baselining and perverse incentives were common topics in official consultations. The government has deliberated on the different circumstances where degradation may take place (both intentionally and accidentally). It has tasked local governance actors with checking the baselines that are submitted to them against fixed dates – either 30th January 2020 or 25th August 2023 – depending on whether the degradation was in accordance with planning permission or not. Local governance actors are asked to rely on historic spatial data, such as local data or Defra's national MAGiC map, to do this.

The government has also been asked to develop more detailed guidance on baselining in certain circumstances, such as where large and multi-phased development projects take place over a number of years (and when therefore to record the biodiversity baseline, which may naturally change over time without direct action).



Lessons learned

- Consider what transparent baselines and common datasets can be used and how these might be updated over time, along with how disputes may be resolved in a streamlined way. Transparent baselining can also be assisted through central governance mechanisms – such as public registers of gains and losses, and central regulatory bodies (see Establishing Central Governance).

Multipliers

Multipliers can be added within the metric to vary the value or score that is given to the habitat or other core proxy – both at the baseline and post-implementation state. These are typically to make the metric more effective in delivering its target outcomes.

England's metric multipliers can be sorted into two categories:

Quality based multipliers:

- **Condition** – England's condition multiplier can be used between parcels of the same habitat type on a site. Categories range from 'N / A – Other' to 'Good', with scores ranging from 0 to 3. The site assessors are required to fill out a separate condition assessment sheet, which sets out several criteria for different types of habitats and then automatically scores the habitat condition based on the number of criteria met. For example, hedgerows are scored on average width, gaps from base, presence of different vegetation and invasive species, and signs of human disturbance.

Natural England and Defra have worked very closely with the ecology sector and other key stakeholders to standardise the condition assessment and make it accessible for non-ecologist users, though some have commented that this requirement of the metric must be accompanied by more guidance on correct surveying techniques, such as fixed times of year to survey certain habitats features. This is to prevent divergence in condition assessment results from different assessors.

- **Distinctiveness** – Distinctiveness is a measure based on the type of habitat and its overall distinguishing features, such as the habitat's links to species richness and rarity, the extent to which the habitat is protected by designation, or the degree to which the habitat supports species rarely found in other habitats. The distinctiveness ranges from 'Very Low' to 'Very High' and scores range from 0 to 8. The distinctiveness score is pre-assigned to habitat types and is automatically populated when a habitat is entered into the metric.

The distinctiveness categories are particularly relevant to the specific outcomes that the metric is designed to support. The categories to assign different habitats in England's metric were intensely debated as the metric was trailed. The government sometimes published statements on its rationale where there was confusion over what made a habitat more or less distinct. For example, lowland meadows are treated as Very High Distinctiveness, mostly because they have faced a 97% area loss in England since 1935.

- **Strategic Significance** – Strategic Significance is the local significance of the habitat based on its location and habitat type. This multiplier was added to incentivise habitat uplift where it is most ecologically beneficial. The scores are Low, Medium, High and have multipliers of 1 to 1.15. Users of the metric therefore can achieve a 15% increase in units if they are delivering 'the right habitat in the right place'.

This multiplier was designed with Local Nature Recovery Strategies in mind, which are local landscape planning frameworks that spatially identify areas where habitat uplift would be most desirable. LNRSs were also made a legal requirement in the Environment Act, given to 48 different clusters of Local Authorities in England.

At the time that BNG was made mandatory in England, virtually no LNRSs were published, and some stakeholders criticised this as a hindrance on BNG actors that wish to deliver habitat uplift in the most effective places. However, the government also included an interim 'Medium' category that offers a 10% increase in units, if it can be demonstrated that the habitat proposed is ecologically significant, such as through other local ecology datasets or pre-existing local biodiversity plans. Further guidance was brought forward to clarify this option.

Risk based multipliers

- **Difficulty to Establish** – this multiplier reflects the uncertainty in the effectiveness of management techniques used to enhance or create habitats. Like with distinctiveness, the difficulty to establish multiplier is automatically assigned to habitats once they are entered into the metric. Scores range from ‘Low’ to ‘High’ and range from 0.33 to 1 – therefore acting as a discount. There are also two separate multiplier scores depending on whether the habitat is being created (more difficult) or enhanced (less difficult).
- **Time to target condition** – this multiplier is based on the average time taken between starting creation or enhancement of habitats and that habitat reaching its target condition or distinctiveness. The time to target condition is measured in years, 1-30 years, in line with BNG’s legal requirement of permanence. The temporal multiplier is automatically populated based on the type of habitat, whether it is being created or enhanced, and whether the habitat uplift is started in advance of the negative impact on development sites or starting at the same time.

There is an ‘advance/delayed creation’ function within the metric that was expressly designed to incentivise ‘habitat banking’, where compensatory habitats are established ahead of the impact from the development site, and not after or at the same time as the impact occurring. Studies have shown that if a habitat banking approach is taken with England’s biodiversity metric, the units derived from a habitat’s uplift can be two to three times higher – therefore rewarding those that are taking the financial burden of habitat establishment before development (and therefore impact) takes place.

- **Spatial risk** – this multiplier specifically reflects the relationship between on-site development and off-site compensation. Where off-site compensation is needed, the spatial risk multiplier incentivises developers to rely on compensation within certain geographic boundaries. This is to minimise the distance between the loss and the compensation, in line with what some call the ‘proximity principle’ of biodiversity offsets. Discrete boundaries are set using the LPA’s jurisdiction and the border of the National Character Area (NCA), which is based on a combination of landscape, biodiversity and geodiversity features. If a developer purchases units in the neighbouring LPA or NCA, then the unit value decreases by 25%. If the developer goes beyond neighbouring areas, the unit value decreases by 50%.³⁰

Earlier versions of the metric’s spatial risk multiplier were based only on LPA boundaries. This was to align with LPAs’ roles as local governance actors and align their BNG responsibilities to their own planning jurisdictions. However, there were criticisms that this boundary is based much more on administrative factors and there should be a second measure that reflects stronger ecological proximity. National Character Areas were subsequently introduced, along with different boundaries for watercourses and intertidal habitats.

³⁰ A more detailed explainer of the spatial risk multiplier can be found at: [“The Proximity Principle, on-site and off-site measures”](#). UK Green Buildings Council. 2023.

Trading Rules

Depending on the aims of the scheme and what is being measured, it may be necessary to create exchange or trading rules that dictate how the loss of biodiversity can be compensated – both within the site being affected and through off-site compensation.

England's biodiversity metric sets out trading rules that are driven by the distinctiveness of each habitat type and apply up to the point of No Net Loss. For example,

- Very high distinctiveness habitats typically must be replaced with habitats of the same type, for example, loss of lowland meadows should be replaced directly with enhancement or creation of other lowland meadows.
- Medium distinctiveness habitats can usually be replaced with habitats within the same broad habitat type or habitats with a higher 'band' of distinctiveness. For example, loss of upland acid grassland can be replaced with enhancement or creation of lowland meadows.
- Low distinctiveness area-based habitats – such as bracken grassland – can be replaced with any kind of area-based habitat, including grasslands, scrub and woodlands.

The concept of 'trading up' in distinctiveness has been built into England's metric but – all else held equal – this is also permitted with a reduction in size of the compensatory habitat.

It was decided early on that an exchange of larger but lower distinctiveness habitats for smaller but higher distinctiveness habitats is acceptable for the purposes of biodiversity outcomes – meaning the ratio of 1:1 area cover is not required when higher quality habitats are being proposed.³¹ The reverse is typically not permitted, unless bespoke compensation is agreed between the developer and the LPA.

Other national stakeholders have begun to assess the biodiversity metric and how its features – including the trading rules – could be adapted for their own contexts. For example, the Scottish government's assessment of England's biodiversity metric includes a statement that "trading rules that integrate [both] distinctiveness and condition would help to avoid grouping habitats of different innate value". It uses the varying biodiversity value of upland acidic grassland in the Scottish context to demonstrate this point.³²



Lessons learned

- If the scope and scale of the metric is narrow, trading rules may not be strictly necessary. For example, if there are only a few types of habitats (or biodiversity proxies) being targeted, and there is confidence that there is available supply for 'like-for-like' compensation, then trading rules become redundant. The broader and more complex a BNG model is, the more trading rules become increasingly necessary.
- If using trading rules, stakeholders may decide to make these more or less nuanced depending on their target outcomes for the metric and their own values placed on habitats that have different features – such as condition, location, and distinctiveness.

³¹ Based on public feedback, a view was built into the Excel sheet that shows the value change in habitat area cover as well as unit value. This was to support approvers' (either LPAs or RBs) decision-making on where loss of habitat area may be less acceptable despite the 10% criteria being achieved – e.g. woodland cover.

³² Scottish Government. "[Results: Metric 3.1 Applicability Scotland.](#)" September 2023

Intersection with existing environmental requirements

In assigning value to habitat uplift or other biodiversity proxies, developers of any biodiversity metric will likely need to define relationships between the metric and other environmental requirements that intersect with the land use change or action that the metric is incentivising. This applies to calculations for both the impact site and the compensation site (when compensation is being used).

For example, for England's biodiversity metric, provisions and rules are required for the metric's use alongside pre-existing policy for:

- Protected sites
- Protected species
- Protected habitats
- Green infrastructure
- Environmental licencing

For some of these, users of England's metric are allowed to meet different requirements from the same habitat uplift. For example, where the habitat meets both criteria, property developers can use grassland on-site to meet both BNG and sustainable urban drainage requirements. However, if the developer is required to restock replacement trees from specific tree felling practices (requiring a license in England), this same action cannot also be used to meet their BNG requirements.

Where negatively impacted, Irreplaceable Habitats – such as ancient woodlands – are excluded entirely from the metric calculations of a developer and fall under separate protections. However, their inclusion is permitted in calculations where they can be improved or expanded, provided no impact has occurred. This decision was taken specifically to protect Irreplaceable Habitats where harm is posed, and to avoid implying that a 'net gain' could be achieved when irreplaceable habitat is lost or create any interference with the existing policy protections for these habitats.



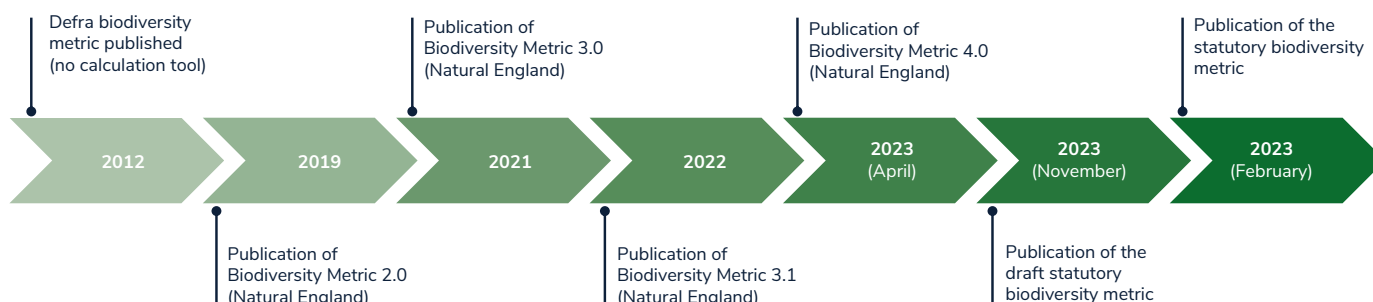
Lessons learned

- Establish the role of a biodiversity metric within a broader analysis of policy instruments and levers (see Establishing Central Governance), as well as stakeholder engagement to determine the market and wider cultural sentiment. Such decisions need to balance the important concept of legal additionality versus the recognition of the ability for a habitat or action to deliver multiple environmental 'co-benefits'.

Testing the metric and supporting guidance

Most would agree that the English government took an extensive and public approach to how it developed the metric, its key attributes and the supporting guidance. It published five major versions over 10 years. It also took learnings from market and industry stakeholders that developed their own version of the metric early on.

Many public stakeholder groups gave feedback on early versions of the metric, including eNGOs, environmental consultants, academics, particular habitat and species specialists, but also target user groups such as LPAs, property developers and land managers.

Figure 9: Metric Development Timeline

The below is a brief timeline of the major test points and findings from this consultation.^{32b}

Official Metric Version 1.0 (2012)

- Within the offsetting pilots (2012), involved stakeholders generally felt that:
 - Version 1.0 was a consistent, transparent and simple method to measure biodiversity changes that accounted for a wider range of impacts than prior practice.
 - However, some had concerns that the metric omitted certain ecological aspects, was more intensive than current practice, and misvalued certain habitat types.
 - Version 1.0 was also a simple set of PDFs with rules within them, and so the pilots were required themselves to construct a calculation tool.
- When discussed in the government’s internal Environmental Audit Committee in 2013, members considered the metric too simplistic and that a “proper metric needs to reflect the full complexity of habitats, including particular species and ‘ecosystem networks’, and recognise the special status of ancient woodlands and sites of special scientific interest”.³³

Metric Version 2.0 (2019)

- First introduction of a calculation tool – the Excel spreadsheet – that automated the metric calculation process.
- Addition of connectivity and strategic location for the calculation of base pre- and post- intervention units.
- Risk based multipliers made up of ‘difficulty of habitat creation’ x ‘time to target condition’ x ‘spatial risk’ also included for calculating post-intervention units.
- Addition of new ‘very high’ distinctiveness score for highly threatened and internationally scarce habitats.
- Improved treatment of features such as urban trees and green roofs.
- Intertidal habitats were added as a sub-version with EUNIS habitat classifications, which allowed BNG to be applied to intertidal habitats in a more standardised manner.

^{32b} Stuart et al. “[How England got to Mandatory Biodiversity Net Gain: A Timeline](#)”. July 2024.

³³ Environmental Audit Committee, “[Biodiversity Offsetting: Sixth Report of Session 2013-2014. HC 750. London: House of Commons](#)”. 2023.

Metric Version 3.0 (2021)

- Removed connectivity from the metric due to technical difficulties caused in the Excel.
- Published with a small-sites metric, designed to make biodiversity assessments for small developments more proportionate.
- Included multiple other improvements and changes, reflecting feedback from the 2019 metric consultation.

Metric Version 3.1 (2021)

- Relatively small changes from 3.0, mainly focusing on clarifying guidance and revising condition assessments.

Metric Version 4.0 (2022)

- Changes made primarily focused on ease of use and changes to the how the spatial risk multiplier was applied at baseline.
- Was positioned as the likely basis for the full statutory metric, before being put through England's legislative process to mandate it in the Environment Act.

Draft Statutory Metric (2023)

- Small updates from Defra metric 4.0 with updated guidance, including a very short list of irreplaceable habitats.
- Introduction of Biodiversity Gain Hierarchy, only requiring the mitigation hierarchy to be followed for habitats classified as High distinctiveness or higher – later reversed (see *Establishing the Need for BNG*).

The English government ran and commissioned many training programmes and resources to upskill potential metric users, including planning authorities, property developers, landscape architects and ecologists. Despite this, some market stakeholders have stated that the official Excel is too difficult to use and lacks functionality – such as integration with other data software – calling for a digital version of the metric to be produced. While the government is exploring potential digitisation options, it has maintained that introducing the metric first as an Excel is important for accessibility of new market stakeholders, who may not all have access to digital products.



Lessons learned

- Consider whether to provide a tool to standardise calculations and, if so, what format to use – balancing accessibility with sophistication. Ensure this is accompanied by sufficient training, guidance and upskilling programmes of key stakeholders.
- Ensure that the metric is fit for the environmental impact being addressed – such as the small-scale losses of habitat and feasible compensatory actions.
- Ensure the metric is fit for the target user group. If the user group is likely to have capacity to bring in ecological and technical expertise – such as large companies and estate owners – then the metric can be made more complex and ecologically nuanced. However, less capable stakeholders will not be able to use the metric with ease or consistency, which will reduce the effectiveness of the overall model. In England's case, a second metric was created specifically for small site property developers, to reflect their more limited capacity.
- Consider how to set and publish a timeline for stakeholder consultation directly relating to the metric, complimenting this with any pilots and ecological research programmes planned.

Modelling Habitat Outcomes

At certain stages of the metric's development, Natural England ran computer simulations with land development data to understand what habitat outcomes may be more likely, based on the metric's multipliers, trading rules and other attributes.

At one point, a simulation gave over 1.6 million calculations. This data revealed there was a disproportionate presence of garden allotments and certain types of scrub in the model. Natural England then used this data to change the metric, so that these habitats would be less incentivised when the metric was launched by government.

Defra and Natural England are now capturing planning data and data through the off-site register (see *Central Governance*) to understand what habitat outcomes are being proposed in reality and how the metric may need to be changed to better balance these.



Lessons learned

- Run simulations and tests to the best of your ability, so that potential outcomes can be predicted and the metric adjusted to better align to target outcomes.
- Use such data to provide further clarity over the scope of the metric to the target user groups. For example, potential off-site providers may have expectations that the metric can best serve certain types of habitats that are not as incentivised for the metric. This misalignment of expectations should ideally be avoided before the launch of the metric and the overall BNG scheme.

Establishing channels for change and iteration

A biodiversity metric should be iterative to reflect the latest ecological and scientific findings, and also build on the evaluation of realised outcomes. At the same time, caution should be taken to not make large changes too frequently once the metric is launched, to avoid causing excessive disruption and uncertainty amongst its users.

The opportunity for change will depend on the way a metric and the overall scheme is delivered.

England's metric is underpinned by legislation (the Environment Act 2021); therefore its iteration is partially limited to England's parliamentary review process. Specifically, any changes that result in a change in the unit values of the metric – such as adjustments to the multipliers – must be reviewed by Defra's Secretary of State and put forward in a statutory consultation at a period of every three to five years. Natural England is the official body tasked with making recommendations for the statutory consultation. It continues to conduct ecological research and beta testing with external stakeholders for this purpose.

Defra and Natural England have suggested a number of potential changes to the metric for the next statutory review. These include building in measures for habitat connectivity, digitisation of the metric, and exploring minimum area sizes of habitats used in on-site and off-site compensation. However, in the interim, Defra and Natural England may make changes through guidance, useability and other metric features. For example, Defra published the first metric update since its statutory launch (12th February 2024) on the 23rd of July 2024, with updated guidance on how individual trees and private gardens must be recorded within the metric, among other things.



Lessons learned

- When designing the metric within the overall scheme, stakeholders are encouraged to think about any fixed periods or windows of time for certain changes to be made, versus where changes can be made with more flexibility. It is also important to note how any changes to the metric after implementation may affect those that have already adopted the metric in ongoing habitat plans and compensation schemes.



Working with the demand side

England's BNG model is driven by its land and property development sector, such as the construction of residential and commercial buildings, small-scale utility infrastructure and public works.

As of October 2024, England's BNG model currently applies to planning applications submitted under the Town and Country Planning Act (TCPA), including 'major' developers and 'small site' developers that build on sites of typically 0.01km² or less. These cover the most common planning applications within England's planning system. In November 2025, the model will be extended to Nationally Significant Infrastructure Projects (NSIPs), which cover developments like airports, railways and wastewater treatment plants.

BNG is an inherently demand-driven model, as the impact from development must first be modelled or expected before suitable outcomes for biodiversity can be delivered. This includes where impact from development can be minimised or avoided on-site, where off-site compensation is most suitable, or even where development should not take place at all due to the high biodiversity value of the site that is being considered.

Ultimately, England's BNG model aims to internalise the costs of environmental harm over 30 years within the decision-making of property developers. Designing and implementing the model with property developers in mind was and remains a crucial aspect of BNG.

Equivalent BNG schemes can target the environmental impacts of different sectors or types of land use, such as large energy infrastructure or agricultural operations. However, it is important to work closely with whatever sector targeted, so that they can effectively embed BNG within their existing business models and processes. If this is not done, then biodiversity outcomes are unlikely to be realised.

This section covers how England worked with its land development sector to build suitable demand drivers for biodiversity outcomes. This includes how the exact scope of land development was defined, how voluntary developer action was first incentivised and used as a platform for mandatory BNG, how the costs of mandatory BNG were calculated and tested within the context of England's planning system, and what risks and opportunities were subsequently identified. For ease, we have highlighted key takeaways from this section below.

Key takeaways:

- After the first metric version was published in 2012, there was a period of **voluntary action** where property developers and LPAs were creating their own metrics and setting targets.
- **Industry bodies** produced best practice principles, case studies, process-based standards and other helpful resources.
- Some property developers supported the idea of mandatory BNG to set a 'level playing field' and a **more consistent operating landscape**.
- Modelling the **costs of mandatory BNG** was crucial, as it showed that these were a small percentage of total costs, and that property developers could largely pass on the costs to the prices of the underlying land that they would develop.
- The English government set boundaries within the BNG model for property developers, such as **non-offsetable impacts** and how BNG may align with **other environmental requirements**.
- Some **exemptions** were introduced to help mitigate the risk of unequal impacts **of the BNG scheme, such as on smaller versus larger developers**.
- England is using a **phased approach** to bring in different sub-sectors of development, such as Nationally Significant Infrastructure Projects, which are typically much larger and complex.

Setting principles for demand

In early scoping of the need for BNG, the English government centred on some core principles that would guide how mandatory BNG would interact with the development sector:

- **The mitigation hierarchy should be adhered to in designing developments**
This means avoiding impact on-site first, then using on-site habitat creation or enhancement to mitigate this impact, then using off-site compensation – first seeking out local off-site providers and then using the government's statutory credit scheme as a last resort.
- **Local communities should be sharing in benefits of habitat creation and restoration**
To ensure that England's BNG does not lead to industrialisation of local areas and a displacement of habitats, developers should be incentivised to retain, restore or create habitats locally. This is enforced by the mitigation hierarchy but also the spatial risk multiplier of the metric, which penalises developers for purchasing off-site units further away from the development site (see *Developing a Biodiversity Metric*).
- **BNG compliance should be simple, streamlined and clear within the planning system**
Delivery of BNG is placed within England's existing planning system, which requires developers to consult with and submit their development plans to LPAs before they can proceed with development. This means their BNG plans must be submitted and assessed along with other environmental requirements, such as sustainable urban drainage, green space requirements, and potential impacts on local waterways. In this way, developers do not need to address a new system or authority to comply with their BNG requirements.

- **Efforts to comply with BNG should be considered in proportion to size and capability**

England's land development sector is varied in its composition. Developers can range from individuals or small businesses developing sites that are a few metres squared, to large multi-national organisations that have planning applications on a landscape scale. To avoid penalising those with limited internal resources, the BNG scheme is designed to alter requirements based on the size of the development (see below).



Lessons learned

- Set early principles for how the model will work for the targeted sector, giving due consideration to both existing policy and the wider socio-economic context. For example, countries may decide not to incentivise local habitat compensation, due to social attitudes of keeping natural spaces separate from anthropogenic pressures and existing policy on public access to greenspace.

Leveraging voluntary action

Before its passing as a mandatory requirement in 2024, BNG as a concept was adopted by some influential property developers on a voluntary basis.

Following the 2012-2014 biodiversity offsetting pilots – where the first version of the biodiversity metric was published – several larger property developers and LPAs began to iterate on the overall concept. This includes producing their own metric versions, targets and other tools. For example, in 2016 Barratt Homes – one of the largest housebuilders in the country – set a net positive biodiversity policy with their own metric.

Stakeholders within the development sector at the time comment that the advent of the biodiversity metric allowed these property developers to shift their views of ecology and environmental impact assessments from a risk-based activity to a targets-based opportunity. The ability to demonstrate that a development can 'leave the environment in a measurably better state than it was beforehand' through a Net Gain approach was seen as highly useful. It was also appreciated by some major property developers that were facing pressure from their stakeholders – such as regulators – to deliver better biodiversity outcomes.

This voluntary action also led to a wave of industry-led guidance and tools being created. Notable examples include:

- The 'Biodiversity Net Gain: Good Practice Principles for Development' (CIEEM, 2019) – this was seen as a comprehensive guide for developers to follow BNG, published by the major ecology industry bodies in partnership with developers after starting work in 2016.
- Later on in 2021, the British Standards Institute (BSI) published its standard for designing and implementing BNG – this sets out the process for businesses to follow, from feasibility assessment and optioneering on land, through to handing off the site for long-term management.³⁴ This was seen as a key tool for property developers to avoid greenwashing claims in their design and implementation of BNG projects.

³⁴ BSI. "British Standard Institute Process for designing and implementing Biodiversity Net Gain – Specification". 2024.

An example in England of a development that applied voluntary BNG measures is Woodberry Down in London. Woodberry Down is a regenerated residential area that delivered a 42% on-site uplift, measured by an early version of the government's biodiversity metric, in the first two phases of its wider 5,500 home development. This uplift has been achieved through a combination of blue and green roofs, 15 acres of parkland, nature trails and wildlife habitat, and an adjacent reservoir redeveloped into a nature reserve. The development was delivered by one of England's biggest property developers, involved local communities and has won sustainability awards from relevant industry bodies.

Ultimately, this period of voluntary action amongst a minority of developers and LPAs was one of the key drivers for making BNG mandatory across the property development sector. By 2019, there were multiple biodiversity metrics being used by property developers that were of varying scope and quality, and there were several LPAs that had adopted their own mandatory BNG policies (see *Local Governance*). This created an operating landscape of inconsistency, and some property developers began calling for BNG to be made mandatory to create a 'level playing field' across England. This, paired with Natural England's own work on scoping mandatory BNG policy, helped to build support within the English government.



Lessons learned

- Build the business case with the targeted sector to adopt BNG on an informal and voluntary basis. Ideally, leverage the industry's support for making this mandatory at an appropriate time.
- Consider which industry bodies to work with to produce sector guidance, tools and other supportive resources – being mindful of making this suitable for the targeted sector(s) while setting minimum standards for what processes and biodiversity outcomes are being promoted.

Identifying the scope for mandatory demand

When mandatory BNG was being considered in earnest, further definition and refinement was needed to identify exactly what types of land development would be in scope. In England's planning system, different types of development are governed under different rules and legislation. The below types of land development were the subject of much analysis and public consultation in the development of BNG policy.

Major land developments

Property developments under the Town and Country Planning Act (TCPA, 1990) are the main target of BNG policy. The TCPA governs how most property developments through local planning systems and encompass a wide range of developments, including housebuilding, commercial developments and small-scale energy infrastructure, such as solar sites and wind turbines. It also applies to most works undertaken by local municipalities.

The government consulted on the targeting of property developments under TCPA in its 2018 public consultation and found that 78% of respondents agreed that BNG should be mandated for developments under the TCPA.³⁵

³⁵ Defra. "Net Gain Summary of Responses and Government Response". July 2019.

Small site developments

However, stakeholder engagement revealed significant concern over how BNG policy would affect smaller developers that typically work on small sites of less than 1 hectare (0.01km²), who may be at a disadvantage compared to larger developers. This includes through their smaller profit margins, fewer internal resources and less structural power – such as access to competitive financing or political influence.

In England, the composition of the land development sector has historically seen a decline in the share of land development that is carried out by small and medium-sized businesses (SMEs). For example, around 50% of the UK's housebuilding is delivered by the top 10 largest property developers, and the remaining 50% is built by SMEs.³⁶ Many believe that smaller developers are materially disadvantaged within the planning system, and therefore there were calls to design BNG policy to have an equitable impact across the land development sector.

The English government came out with a series of measures that would alter how small site developments would interact with mandatory BNG policy. The below measures were informed by several consultation with small site developers and relevant stakeholders:

- A bespoke small sites metric (SSM) that is a simplified version of the main statutory biodiversity metric, designed with ecological assumptions so that small site developers themselves can complete the metric without assistance from ecologists.
- A simplified Habitat Management and Monitoring Plan (HMMP) that small site developers are required to fill for any on-site habitats that they include within their SSM calculations.
- A delayed phase-in of small sites into mandatory BNG – coming into effect two months on from the date that BNG applied to other (major) developments under the TCPA.
- A simplified process for accessing fractional statutory biodiversity credits – specifically if developers need 0.25 biodiversity units or less, they can purchase these with more ease.



Lessons learned

- Give due consideration to where a mandatory BNG policy may have unequal impacts across the targeted sector(s), and work with relevant stakeholders to minimise this inequality in the policy's design.
- These efforts should be balanced with the overall need to preserve the robustness of the biodiversity outcomes being sought. For example, a centralised resource of ecological expertise could be created to give those actors lacking internal expertise for proper biodiversity assessments.

Nationally Significant Infrastructure Projects

Nationally Significant Infrastructure Projects (NSIPs) are typically much larger developments that bypass normal local planning requirements and are governed by the Planning Act. These include power plants, large renewable energy projects, new airports and airport extensions, and major road and rail projects. NSIPs were under consideration during the 2012-2014 biodiversity offsetting pilots and in voluntary developer action (see below).

While there are clear ecological impacts of NSIPs that made it appealing to include within the mandatory BNG scope, it was decided that NSIPs should not be put within scope of mandatory BNG immediately but come into scope later on (November 2025) once the overall BNG scheme had been operational for two years.

³⁶ Hookway, "How Big UK Housebuilders Have Remained Profitable without Meeting Housing Supply Targets." 2023

This is because the Government considered that these projects “can have fundamentally different characteristics to other development types”³⁷ such as development plans that can stretch across multiple LPA jurisdictions, phased development plans that mean not all planning information is readily available upfront and a likely need to source off-site compensation in large volumes (and therefore carrying a risk of destabilising local off-site markets, if not properly planned).



Lessons learned

- Consider whether it is appropriate for different sub-types of the targeted sector to be phased into mandatory BNG policy over different stages. It may be advisable to delay higher-stake sectors until the overall system is proven and better understood, or to build in further logistical and governance considerations that are required.

Developer-based exemptions

Through consultations and policy development, other exemptions based on the type of development were introduced, including:

- De minimis site size – developments that impact less than 25m² of on-site habitat, or 5m of on-site linear habitat (such as hedgerows) are exempt.
 - Since the launch, further guidance has been provided so that developers and LPAs can better determine what ‘impacted’ habitats entail.
- Self-build and custom build applications – those that qualify as small site developments (see above) and also consist of dwellings that are self-build or custom housebuilding (as defined in relevant legislation).
 - England’s planning system saw a considerable increase in planning applications under the Self-build and Custom-build classification in the few months from the introduction of mandatory BNG. In response to this, the government published more stringent guidance to help LPAs make more robust assessments.
- Householder applications – any developments on occupied residential sites, for example, small projects like home extensions, conservatories or loft conversions.

Exemptions to BNG policy were heavily debated in both stakeholder consultation and legislative proceedings – including within the English government’s parliament.



Lessons learned

- If introducing exemptions to mandatory BNG policy, make sure that these are clearly defined and the relevant governance actors (in England’s case - LPAs) are given sufficient guidance and resource to assess their application.
- Uses of exemptions should also be tracked within a central system to detect whether there is excessive overreliance or unintended use.

³⁷ Defra. “[Net Gain Summary of Responses and Government Response](#)”. July 2019.

Habitat-based exemptions

Some habitats are considered too important to put within scope of BNG. In England's BNG model, these are defined as 'Irreplaceable Habitats'. These are habitats that would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity.

Examples of Irreplaceable Habitat in England include ancient woodland, ancient and veteran trees, blanket bog, limestone pavement, sand dunes, and lowland fen. Irreplaceable habitats outside of England could further include Ramsar wetlands, rainforests, and peatlands.

If a development's site boundary includes Irreplaceable Habitat, any losses or impacts to irreplaceable habitats cannot be calculated by the biodiversity metric tool and they are removed from the baseline. Instead, the property developer must present the LPA with a compelling case for why this impact is strictly necessary and comply with separate processes – such as bespoke compensation agreed and altered development plans.



Lessons learned

- Identify what would be considered 'non-offsetable impacts' in the design of a BNG scheme, within the specific ecological context that it operates within. For example, if an impact poses a threat so severe that it cannot be offset – such as damage to the habitat of a highly endangered species – this should be left out of scope for BNG or any offsetting mechanism.

Testing demand and cost of compliance

When mandatory BNG was under development, property developers and other stakeholders requested more information on the potential BNG-related costs, such as the expected price of a BNG unit and its impact on the viability of land development. In 2018, Defra commissioned an Impact Assessment to model various aspects of BNG.³⁸

One of the key findings of the assessment was that the estimated direct costs to property developers was £199.0m per year (in 2017 prices). However, this would fall to £19.9m once a 90% pass-through of costs to landowners through land prices was considered. Showing that these costs could feasibly be passed onto initial land prices was a key moment in BNG policy's development, as it assuaged fears that BNG would render land development economically unviable. Government and wider market stakeholders generally found the concept of land prices absorbing BNG costs palatable, as in England land ownership is viewed as a more profitable and secure asset class compared to property development.

Following on from the impact assessment, property developers have taken further cost-benefit analysis, such as updated biodiversity unit prices (c.£30k as an average price) and different balances of on-site and off-site delivery – driven by both ecological and financial feasibility.



Lessons learned

- Conduct detailed assessments of where the costs and benefits of a mandatory BNG scheme will fall – being careful to build in considerations of unintended consequences and sectors that may be at risk.
- These costs and benefits should be modelled with clear and feasible assumptions over an extended period of time, such as 10-20 years.

³⁸ Defra's 2019 Impact Assessment on BNG was followed by another Impact Assessment specifically focusing on Nationally Significant Infrastructure Projects in 2021.



Working with the supply side

In the context of BNG, supply refers to the availability of land and resources that can be used to compensate for biodiversity loss. Within England's BNG, this supply can come from separate landowners who provide off-site compensation, as well as on-site mitigation efforts made by property developers – in line with the mitigation hierarchy.

Examples of off-site providers include local farmers, estate owners, local municipalities, or even private companies, such as property developers that own additional land nearby. Anyone with unrestricted land ownership can feasibly put their sites forward for participation in the off-site market. Additionally, third parties can offer landowners services that mean they step in to manage the site, the habitats and the liabilities of the BNG agreement over the 30-year period, in exchange for a larger share of the unit payments. These third parties are typically called habitat bank operators.

An example in England of a habitat bank operator is the Environment Bank, which was first set up in 2006 as a lobbying organisation for the concept of BNG, and as of October 2024 has agreements with landowners that cover over 16km² across England. Several habitat bank operators now operate in the BNG space with different business models and terms of agreement.

This section focuses mainly on the development of supply from an off-site BNG perspective, due to the added complexities when considering third-party provision of BNG. However, many learnings from the off-site provision of BNG can also be applied to how on-site BNG is managed – such as the ways in which the long-term management of habitats is assured.

Below covers the principles that govern BNG's off-site market, how potential supply was tested through pilots and development programmes, how the risks and liabilities of off-site provision have been built into the model, and how the English government has, or is, aligning the provision of off-site BNG with other economic and policy incentives. For ease, we have highlighted key takeaways from this section below.

Key takeaways:

- The English government funded **a series of pilots** to build the business case of off-site compensation with landowners – including appropriate baselining and habitat planning, long-term costs and appropriate legal agreements.
- The 'supply' of off-site compensation in England's BNG is **inherently demand driven**, with local supply largely depending on the scale and timing of local development, and the type of impacted habitat.
 - Initial **estimates of national demand** for off-site compensation were produced that helped to establish early interest from the supply-side.
 - However, since the launch of BNG, more local actors – such as municipalities and environmental organisations – have undertaken **local demand/supply modelling**.
- **Risks** of off-site compensation have been analysed within the BNG model, such as how physical, market, financial management and operational risks are present and addressed.
- Alignment with other **policy incentives** is also explored, such as the allowance of the sale of BNG with other ecosystem services.
- In contrast, new **tax and accounting treatments** bespoke to BNG have not yet been introduced, but as of October 2024 a government working group is focusing on this.

Setting principles for supply

For supply, England's BNG model is based on the below principles:

- **Supply of off-site compensation is driven by the type of impacted habitat.**

By the nature of BNG, the supply of off-site compensation is driven by the type of impacted habitat on development sites, along with the trading rules within the metric (see *Developing a Biodiversity Metric*).

For example, if developers are primarily building on 'other neutral grassland', then there will be no demand for off-site units based on wetlands, heathland, woodlands or lakes – as the trading rules within the metric do not allow for compensation through other broad types of habitat.

This demand-driven approach means that the diversity of habitats offered in compensation schemes can be limited by what developers are seeking. A mitigant to this is that the trading rules within the metric allow the 'trading up' of habitat types within broad groups. For example, the loss of other neutral grassland can be compensated with smaller areas of higher-value grassland habitats, such as acid or calcareous grassland.³⁹

If potential off-site BNG suppliers face a lack of demand for their desired habitat plans, they are advised to seek other options – such as government or environmental NGO grant schemes.

³⁹ Other neutral grassland is labelled as 'Medium Distinctiveness' in the biodiversity metric, which requires compensation of the same or higher level of distinctiveness within the same broad habitat group (grasslands). However, area habitats classed as 'Low Distinctiveness' can be compensated with any type of area habitats of the same or higher band of distinctiveness. For example, bracken grassland (Low Distinctiveness) could be compensated with woodlands, wetlands or heathland.

- **Access to the off-site BNG market is not restricted to any type of landowner.**

Any landholder can become an off-site BNG supplier, provided they meet the requirements of the policy – such as accepting legal responsibility to deliver the habitats over the 30-year period.

Environmental NGOs, farmers, private estates and municipalities (such as local councils) can all use their own land for off-site BNG provision. Intermediaries – such as habitat bank operators – are also eligible to sell units if they gain permission from the underlying landowner and take possession of the land to deliver some or all of the BNG obligations.

The English government chose not to restrict market access to any one type of supplier, in order to prevent any exclusion of land that could serve as viable supply, and to not exclude different landholder groups from the benefits of participation, including the ability to diversify their income streams. However, in practice there are certain types of landholders that may have more indirect advantages than others – such as larger landholders who benefit from economies of scale.

- **Habitats are secured for 30 years, using land covenants that supersede land ownership.**

Habitats created or enhanced for BNG compensation must be secured for a minimum of 30 years. This is achieved through the use of land covenants, such as Section 106 agreements or conservation covenants (see *Establishing Local Governance for more detail on these*). This requirement also applies to significant on-site gains.

These legally binding land covenants are attached to the land itself, meaning the obligation to maintain the habitats remains attached to the land regardless of who owns it over the 30-year period. By making these commitments transferable through land covenants, the BNG model creates a stable, enforceable framework that supports the longevity of biodiversity improvements.

The choice to base BNG agreements on a 30-year period specifically was the subject of much debate in stakeholder and government consultation. While many stakeholders called for permanence, ultimately it was accepted that maintaining sites in perpetuity would not be appealing or economically feasible for the supply-side. 30 years was agreed as a comfortable middle ground, with the 30-year mark having some precedent in UK-based carbon markets and hedgerow regulations.

- **Habitat banking is incentivised, but lower risk market participation is offered.**

Supply of off-site BNG habitats can be delivered via two broad transaction methods:

1. Habitat banking is where habitats are established on a speculative basis, with unit sales agreed after the site has been legally secured with a land covenant and registration on the national biodiversity gain sites register. This option carries a degree of market risk and also relies on the off-site provider being able to pay the development costs of the BNG site, including the site surveying, legal and registration fees, and the up-front habitat works. This is often called ex-post compensation.
2. Bespoke compensation is where habitats are only secured where there is a confirmed land developer seeking some or all of the units that the off-site supplier is offering. Sometimes, the land developer may pay for some of the development costs to prepare the site. While this mitigates the market risk of habitat banking, this means that fewer units will be available from the site, as the ‘time to condition’ multiplier within the metric rewards habitats that become more established before being allocated to developer (see *Developing a Biodiversity Metric for more detail*). This is often called ex-ante compensation.

The English government recognised the ecological preference of having pre-established habitats before biodiversity impact takes place, but ultimately decided to offer an option of market participation to off-site providers that would not rely on their having ample resource and risk appetite – which could lead to significant shortfalls in supply. This decision is also aligned with the principle of keeping market participation open to different types of landholders.

Other biodiversity compensation schemes have taken different approaches to how habitat banking or ex-post compensation is incentivised or required.

For example, in the US's compensation schemes for wetlands, streams and endangered species, credits from mitigation banking are tied to meeting ecological milestones. In the US, typically a smaller tranche of credits (15%) can be sold upfront, but the full number of credits are not released for five to 10 years. Mitigation banks typically receive a lot of upfront investment from lenders to help bridge this gap.



Lessons learned

- As with demand, decide on high-level principles for how the BNG scheme will channel the supply of off-site compensation and communicate this with potential market stakeholders to gauge how these principles are delivered in the scheme's design and in practice.
- Ex-post biodiversity compensation – where habitats are established before credits or units are sold – is ideal for delivering robust ecological benefits, but scheme owners may decide to (carefully) balance this with consideration over market accessibility and the benefits of ex-ante compensation.
- Ensure that there is consistency between the provision of on-site and off-site biodiversity compensation, such as requirements to maintain the habitats (or equivalent biodiversity proxy) over a set amount of time.

Testing supply and cost of delivery

Predicting the scale of an off-site market

In 2021, Defra published an England-wide market analysis and found that a compliance-based market could generate annual demand for around 6,200 off-site biodiversity units with a market value in the region of £135 million.⁴⁰ This used a series of assumptions, such as:

- A 50/50 split between on-site and off-site BNG delivery.
- A £20,000 unit price, rising to £25,000 in areas where there is scarce supply.

It concluded that the market has potential to meet demand for off-site biodiversity gains. However, it stated that shortages of supply are a risk in the early years of the market and for highly urban areas, islands, and some habitat types. It suggested that most instances of local shortages are likely to be alleviated by allowing development to use biodiversity units purchased from outside of the local area – such as through cross-border sales (see *Establishing Local Governance for more detail*).

Since this market analysis was published, a handful of local municipalities and nature-based partnerships have undertaken more bespoke analysis.

⁴⁰ Defra. "Biodiversity Net Gain: Market Analysis Study." February 2021.

For example, a nature-based partnership in Oxfordshire published its own study that used a £25,000 unit price and an off-site delivery share of 7%^{40b}. This found that the BNG off-site market within Oxfordshire would generate a market for 47,000 biodiversity units and £83m in revenue over 10 years. However, the study also highlighted that most of this funding would be used to compensate for development's impact, and that the net gain proportion of habitat uplift would only represent around 10% of the region's habitat creation costs to meet its 30x30 target – 30% of land protected by 2030. It also showed what types of units – for example, grassland and heathland – would likely be most demanded.

Studies like this were useful to show the wider market, the extent of local off-site markets and temper expectations of how much BNG could contribute to nature recovery targets.



Lessons learned

- Conduct a spatially explicit assessment of where and what volumes of demand are predicted, using this as a signal to potential off-site suppliers.
 - Work with local authorities (such as local planning authorities or nature-based partnerships) to use local data.
 - Consider funding local areas directly to undertake their own analyses, giving them a consistent methodology and aligning with relevant environmental targets.

Use of pilots

The English government needed to build an understanding of how potential suppliers could build robust BNG proposals and deliver these across the 30-year period. This includes ecological baselining, financial modelling and appropriate unit prices, testing insurance and legal mechanisms.

To do so, it funded pilots and development programmes. The main two programmes were:

- **Biodiversity Net Gain Pilots**

In 2020, Natural England selected nine different landowners to test how BNG would work in practice for potential off-site providers. It was run over four phases from 2020-2023 to test different aspects as the policy was being designed. In total, there were nine pilots selected, though not all continued through every stage of the process.

Activities within the pilot included:

- Ecological baselining and BNG uplift scenarios, using early versions of the metric.
- Testing the metric itself for the ability to capture different habitats' biodiversity values, such as hedgerows and isolated trees.
- Creating habitat management plans and costs over a 30-year period.
- Basic financial modelling and legal scoping for securing the sites.
- Local market testing and work with local authorities.

Funding and direct support were given to the landowners, who comment that, at times, it was useful to have centralised resources, but other times it was important to allow for local expertise to be used. For example, in the first phase of the pilot the landowners found that the initial version of their BNG management plans and costings – delivered by a central consultancy – did not fully reflect the realities of dealing with agricultural land (and therefore viability of habitat creation). The subsequent phase allowed the landowners to bid for funds and hire their own trusted advisors to iterate on this work. This gave the landowners much more confidence in BNG's feasibility for their sites.

^{40b} Hawkins et al. "The Potential Contribution of Revenue from Biodiversity Net Gain Offsets towards Nature Recovery Ambitions in Oxfordshire." 2023.

The landowners also comment that initially there was not as much discussion with core policy teams and clarity over how their outputs were being used. Subsequent phases saw much more open discussion between the landowners and core policy teams within central government, which significantly accelerated both the outputs of the pilots and the development of the policy.

Overall, the pilots were extremely helpful in testing the business model of off-site BNG provision and providing policy-related insight. The learnings of the pilots were also shared widely to support communities of practice of potential off-site providers in England.⁴¹

An example of one of the pilots is Spains Hall Estate, a 843 hectare family-owned farming estate in Essex that plans to offer c.500 biodiversity units over 100 hectares through a combination of scrub, grassland, wetland and woodland habitat uplift. Spains Hall Estate has designed these habitats in line with a broader vision of making the estate more ecologically resilient from threats such as drought and flooding. As of October 2024, [Spains Hall Estate](#) has signed its first Section 106 agreement with the local LPA for the first tranche of units that it plans to sell, having located a buyer ahead of time.



Lessons learned

- Set up supply-side pilots with a clear rationale for the outputs being sought.
 - Be prepared to bring in pilot participants into detailed discussion and collaboration with policy developers.
 - Be mindful of budget flexibility and how funding is offered, such as the benefits of sourcing local expertise and optimal times of year to undertake ecological surveying.
 - Balance the need to develop overarching supply-side policy alongside detailed guidance – such as the particulars of ecological baselining.
 - Share the learnings of the pilots more widely to facilitate interest across potential off-site suppliers and collaborative communities of practice.
- **Natural Environment Investment Readiness Fund (NEIRF)**

The NEIRF was established in 2021 and, as of October 2024, is operational in its third round of funding. It offers funding of up to £100k for projects – led by land managers, farmers, eNGOs and others - to explore private revenue models for nature. It supports the development of a range of mechanisms, including BNG, but also carbon credit sales, payments for water quality uplift and natural flood management.

Across the three rounds and c.130 projects funded, around half of the projects have opted to explore BNG – either exclusively or alongside other environmental revenue streams. This was reflective of the interest in the wider ecology and land management sectors in compliance-based BNG at the time.

Though broader in scope, BNG-focused learnings from the NEIRF were also highly relevant and helped to inform both government policy and wider market interest. For example, different projects explored:

- The use of repayable or patient finance in habitat banking.⁴²
- The co-sale of BNG units and wildflower seeds harvested sustainably from the habitats.⁴³
- The use of BNG alongside other environmental initiatives to improve ecological resilience.⁴⁴
- Aggregation vehicles for supporting BNG delivery across local municipalities⁴⁵

⁴¹ Case studies of five of the pilot projects were among the resources published and can be found here: <https://publications.naturalengland.org.uk/publication/5948412314779648>

⁴² See [Wildlife Trust Habitat Banking Investment Model](#) as a useful case study on this.

⁴³ See [The Eden Project's National Wildflower Centre](#) as a useful case study on this.

⁴⁴ See [The Wendling Beck Environment Project](#) as a useful case study on this.

⁴⁵ See [Greater Manchester Environment Fund](#) as a useful case study on this.



Lessons learned

- Explore or support the exploration of BNG amongst other ecological financing mechanisms available, to gauge the relative strength of the business case for suppliers and how BNG may intersect with other environmental incentives in practice.

Identifying liability and risk

Risk and liability must be built into a biodiversity compensation model, particularly where a market-based approach is being taken such as with England's BNG scheme. Increased liability for off-site providers directly correlates with higher costs, which must be factored into the pricing of BNG units to ensure that they can cover these risks while delivering on their commitments.

Below offers an overview of the common risks that off-site providers face and how these are treated within the BNG model.

- **Physical risk – how can habitats be planned and managed to minimise habitat loss?**

Physical risk in BNG involves the risk of habitat failure, such as habitats that are created in unviable conditions, face implementation issues, or are degraded by disease, bad weather or poor management. This risk also applies to the provision of on-site habitats.

Within England's BNG, the risk of habitat failure is managed through:

- The biodiversity metric – which disincentivises the off-site provider from proposing habitats more prone to failure through the 'difficulty to create' multiplier. The metric uses different values depending on whether the habitat is being created or restored. Some off-site suppliers have voiced that the multiplier is disincentivising valid opportunities to deliver more complex and distinct habitats, and that other factors that mitigate physical risk, such as habitat connectivity, should be built in.
- The Habitat Management and Monitoring Plan (HMMP) – which is submitted to the LPA or RB and includes set monitoring schedule and a risk register that sets out key risks and what steps or remedial actions must be taken in the event the habitat's target uplift is not delivered – such as adaptive management measures against rising temperatures. The government has suggested minimum monitoring intervals at Years 1, 5, 10, 20 and 30 to allow for progress updates and corrections where delivery is off-track.
- The land covenant (the S106 agreement or conservation covenant), which mandates that the HMMP is followed but does not penalise the off-site provider if the actions set out in the HMMP do not deliver the target uplift. Force majeure factors – such as fire or flooding - should be included here, but in some cases these provisions are drafted with loose or non-comprehensive definitions. Depending on the wording of the land covenant, habitat managers may not be responsible for restoring or compensating for any lost habitats.

Overall, off-site suppliers and their counterparts (such as developers and LPAs) have deliberated on the balance between reasonable attempts to mitigate physical risk and the practicalities of habitat management. This includes the need to recognise that habitat managers should only be liable up to a point, due to the unpredictability and uncontrollability of nature. There is also a recognition that the scope for adaptive management practices can be built into original plans so that off-site suppliers are able to take action in line with changing environmental factors, if appropriate.



Lessons learned

- Physical risk must be factored into the metric and/or the governance structure of the BNG scheme, so that off-site providers are sufficiently incentivised to take care of habitats and not over-promise outcomes that may be more financially incentivised otherwise.
- Liability of physical risk should be clearly defined for off-site providers – such as the identification of necessary activities over the 30-year period – with a recognition of factors beyond their control, such as force majeure.
- This need should be balanced with the ability of off-site providers to recognise and act on unique environmental circumstances that may not be formally recognised at a high-level:
 - Landscape level planning may be helpful for identifying areas that are genuinely viable for more difficult and complex habitats.
 - An adaptive management approach that allows off-site providers to systemically test and adapt their habitat management plans can drive optimal biodiversity outcomes.⁴⁶

- **Financial risk – how can habitats be financed in the long-term?**

Off-site providers must correctly estimate the costs of delivering and managing the habitats over the 30-year period, building this into the price of the biodiversity unit paid by the developer. This price is usually delivered through a single, up-front payment – though the structuring of payments is set between buyer and seller. Costs include initial habitat works, monitoring and reporting costs, maintenance and remedial works, and longer-term administrative and legal costs. There are also considerable development costs of creating a BNG proposal that off-site providers want to recover. Robust financial modelling can be a challenge with uncertainty over what expenses to include and how to price them, including what inflationary measures to use.

In England's BNG, this is largely left to the off-site supplier to decide due to the significant cost variability in different BNG proposals, though local governance actors (LPAs and RBs) assess their financial modelling as part of their signing the land covenant. It is expected that the market and relevant industry bodies will produce more guidance and consistency on this issue as the market is further established.

Additionally, long term funding mechanisms must be established to correctly manage funds over the 30-year period. Stakeholders – such as LPAs and RBs– generally want assurance that funds paid to off-site suppliers are not being mismanaged and pooled with other financial flows, such as general accounts. However, off-site providers also need to have access to these funds for the viability of the habitats themselves – such as unexpected remedial works. In England's BNG model, stakeholders are exploring appropriate controls for financial governance, such as clauses within land covenants and centralised endowment funds.⁴⁷

This risk also applies to on-site habitats, where developers are likewise tasked with setting aside funds for their long-term management, usually passing the funds and the obligations to a third party, such as a property management company or environmental organisation (see *Working with the Demand Side*).

⁴⁶ For more information on the adaptive management approach, this Guidebook recommends Section 4.5 (p24) of BBOP's Offset Implementation Handbook.

⁴⁷ For more information on the use of long term funding mechanisms, this Guidebook recommends Section 3.2 and 3.3 (p19) of BBOP's Offset Implementation Handbook.

Other examples of managing this risk include the US wetland and stream mitigation banking scheme, which requires mitigation banks to set aside an endowment fund, usually from the sale of credits, which can be used in perpetuity by the landowner to maintain the property. In practice, this is difficult to replicate in England due to differences in tax policy.



Lessons learned

- Provide or support the provision of guidance on robust financial modelling of long-term biodiversity compensation – being mindful of how cost bases can vary across different habitat proposals and geographies.
- Set up or promote appropriate financial governance structures – such as centralised endowment or conservation funds that can manage funds over the long-term.
 - Make sure that those charged with habitat management have appropriate access to such funds.

• Operational risk – how can roles and responsibilities be correctly assigned?

Participation in BNG can require a range of skills and experience – including but not limited to the ecological expertise required to deliver and maintain habitats over a 30-year period.

While keeping market entry as broad as possible (see *Setting Principles for Supply*), there were concerns flagged in public consultation about the possibility of new market entrants that might not operate to the required standards. Likewise, underlying landowners with viable land for off-site compensation may wish to participate but be deterred due to their lack of resources and expertise.

The launch of BNG has seen a wave of service providers enter the market. This includes habitat bank operators, which typically take possession of the land (such as leasing from the landowner) to deliver and maintain the habitats over the 30-year period, in exchange for a majority share of the income from unit sales. Other examples include brokers, digital surveyors, lawyers and specialist advisors.

While LPAs and RBs are responsible for assessing habitat proposals, they typically have limited resources to carry out further due diligence on landowners and organisations coming forwards with BNG proposals. There are also concerns about potential conflicts of interest, such as service providers that work for both demand and supply-side actors, which could undermine the robustness of proposals being brought forward.

Since BNG's mandatory launch, Natural England has commissioned a scoping study of wider quality assurance mechanisms, such as an accreditation scheme for off-site providers and a developed role of insurers, to address these issues. Stakeholder engagement has shown there is broad support, but suggestions that an inflexible or onerous system of accreditation could limit supply and exclude those, such as local NGOs, who might be best placed to deliver high-quality compensation.



Lessons learned

- Place adequate controls on how off-site proposals are assessed, including the provision of third-party services to underlying landholders.
- Consider where third parties can provide specialised services to underlying landowners in off-site compensation, being mindful of how agreements can be structured with risks and rewards allocated appropriately, along with conflicts of interest.

- **Market risk – how can price volatility be managed for off-site providers?**

Within England's BNG model, off-site providers that opt for a habitat banking approach accept a degree of market risk due to the lack of price guarantee. It is possible that off-site providers will not achieve the required price if they first establish the habitats and wait for them to mature through the 'time to condition' multiplier – which can take between 1-30 years depending on the type of habitat and its target condition.

One mitigant to this is the offer of 'bespoke habitat compensation', where off-site providers can sell units upfront to lock in price certainty (see *Setting Principles for Supply* above). Off-site providers can also use a combination of up-front and phased sales to take advantage of both bespoke compensation and habitat banking in their risk management – however this does carry an additional administrative burden.

Another mitigant is the use of legal contracts. Off-site providers can build in exit clauses into their land covenants if they do not secure appropriate unit sales with developers, essentially removing the 30-year requirement if there is no income to service it. This gives the underlying landowner the freedom to use the site for other purposes. In England's BNG, it has been proposed that landowners can potentially enter the land into government subsidy schemes that focus on the environment, to recuperate some of the costs while keeping the habitats intact, though as of October 2024 this option has not yet been observed.



Lessons learned

- Build in mitigants to market risk within the scheme that accounts for how prices may change for the units or credits sold. For example, offering:
 - Forward-looking sale agreements, similar to carbon off-take agreements.
 - A government or centralised body acting as the buyer of last resort.
 - The ability to exit obligations if prices are not achieved, or pivot to other environmental payment schemes.

- **Policy risk**

Policy risk is inherent within England's BNG model for off-site suppliers that might face difficulties with, for example, changes to the statutory biodiversity metric or new monitoring requirements set by central government. Though difficult, BNG schemes can build in some mitigants, such as scheduled periods of review that give visibility over when policy change may occur, and protections for pre-existing BNG agreements.

One notable policy risk in England's BNG model is the treatment of the underlying site once the 30-year agreement is concluded. Off-site providers (and to a lesser extent on-site providers) have voiced concerns that there is a lack of certainty around how the site will be treated – such as whether it would face extensive environmental requirements due to its enhanced biodiversity value.

The English government has not been able to confirm a set position on this issue due to the time horizon, but the below high-level possibilities have been discussed by wider market stakeholders:

- High-value habitats are ecologically classified and protected, receiving grant funding from central government for their maintenance.
- Medium-value habitats can be assessed for further uplift within the BNG market, and landowners can enter into a subsequent BNG agreement that allows for the habitat's value to be further improved.

- Medium-to-high value habitats may also be eligible for certain environmental subsidy schemes offered by central government.
- Habitats of relatively low biodiversity value have no remaining obligations – in which case the landowner is free to decide on the land use.



Lessons learned

- Changes in the underlying policy can affect existing participants in the BNG scheme and assurances or protections may be appropriate.
- If the underlying sites are not being secured in perpetuity, consider what options the underlying landowner may have once the obligation is no longer applied – ideally incentivising them to retain or improve the habitat through other economic and policy incentives.

Aligning economic and policy incentives

Aligning the delivery of BNG compensation with broader economic and policy incentives is essential for ensuring their long-term success. This alignment can promote financial sustainability and enhances the effectiveness of biodiversity outcomes within the framework of national environmental and economic goals. Equally valuable is the clarity over where such incentives are to be kept separate and distinct – to preserve integrity and concepts such as additionality.

Within England's BNG model, the below policy and economic incentives have been considered for off-site providers:

Appropriate tax and accounting treatments

A BNG scheme can introduce new types of transactions that require either clarity over existing tax and accounting standards, or updated standards to reflect the nature of BNG.

For example, landowners in England generally wish to know that any potential BNG sites on their land will not affect their overall tax position on Agricultural or Business Property Relief under Inheritance Tax. These tax reliefs provide significant benefits to the successor when a farm or business owner dies. Other examples include the treatment of income through income tax, how costs are deducted against this income, how a Goods and Service Tax is charged on services relating to the habitats' management, and any tax implications of land value changes.

Within England's tax system, these factors can easily reduce the profitability of a BNG scheme. As of October 2024, the English government provided some clarity of its intention to support BNG through its consultation response and the establishment of a working group within the Tax Authority (HMRC), but formal updates of tax and accounting standards have not yet taken place.



Lessons learned

- Analyse the tax and accounting treatments that might apply through the lifetime financials of the biodiversity compensation scheme, including tax that applies to transactions and to the underlying land itself. These can be crucial incentives or disincentives for potential off-site providers.

Combination with environmental subsidies, grants and other payment schemes

If similar outcomes are sought, a BNG scheme could be designed that simultaneously combines BNG income with public or philanthropic grants and subsidies. For example, woodlands planted or restored in a certain area may have both biodiversity and natural flood management benefits that can be rewarded separately. However, this needs to be carefully considered with the principle of additionality – ensuring that activities or outcomes are not double funded.

In England, BNG payments can be combined with the government's core agri-environment subsidy scheme on the same site, with the provision that activities are not double funded. This is being explored by the farming community in England, in which some view BNG as a potential alternative activity to help diversify farm incomes. However, many landowners have requested further guidance on this as it is not clear how the adherence to additionality can be proven in practice.

Further to this, some supply-side actors have speculated that that BNG payments could be used with grants in a sequential manner – i.e. using one income stream after the other.

For example, the BNG metric does not favour tree planting from a grassland baseline as much as restoring or improving an already established woodland, due to the risk multipliers within the metric (see *Developing a Biodiversity Metric*). However, some have speculated whether it would be possible to use the government's tree planting grant scheme to establish woodlands up to the first three years, followed by a BNG baseline assessment and a 30-year agreement to uplift the habitat. If this use is approved by government, it could reduce pressure on government funding – which supports tree-planting for up to 15 years – and de-risk the woodland habitats for the BNG off-site market at the same time. However, this would introduce an additional administrative burden to the system.



Lessons learned

- Assess other environmental payment schemes – including public and philanthropic grants – that align with the outcomes being sought by the BNG scheme. Ensure there are clear rules set for off-site providers and local governance actors to follow, including tests for additionality.

Preferential schemes and status

While using market-based mechanisms, there may be appetite to identify and reward 'premium' off-site proposals that offer higher-quality biodiversity compensation, such as those that offer additional monitoring and research activity. BNG scheme owners may simply decide to let this be reflected in unit prices and allow market forces to identify higher quality schemes. However, there may be opportunities to align with other policies.

For example, within England's BNG model, the government has expressed it is broadly supportive of selecting off-site providers for their centralised 'statutory credit fund', which acts as the seller of last resort to developers (see *Establishing Central Government*). In practice, this would mean a select number of off-site providers receive the money paid into the fund from central government to use for their habitat proposals. The aim of government is to identify high-quality off-site proposals that support the ecological principle of "bigger, better and more joined up" habitats⁴⁸ – i.e. larger and landscape scale initiatives. The appeal for off-site providers is that there would be a more stable source of revenue via central government, removing the need to find local buyers for their units.

⁴⁸ This is an often quoted line in BNG policy discussions from the Lawton Review, published in 2010, which focused on the ability for wildlife sites in England to respond and adapt to the growing challenges of climate change.

As of October 2024, the government has not yet clarified the spending and procurement rules that it needs to adhere to for selecting and channelling funds towards off-site providers within the market.



Lessons learned

- Consider whether there is scope and appetite for combining BNG off-site compensation with other initiatives, such as enhanced monitoring and research programmes.
- If using central funds or pools of BNG units or credits, consider how this could be coupled with the market supply of off-site compensation, being mindful of central procurement rules and standards.



Linked professions and stakeholders

Previous sections of this Guidebook have focused on the core roles and types of organisations involved in England's BNG model. This includes central government departments, local municipalities, developers and off-site providers. However, there are other actors in the BNG operating landscape that should be considered by those taking learnings from England's model.

Ecologists

Ecologists and the ecology sector are integral to the successful implementation of England's BNG model. Ecologists play a key role in conducting baseline surveys, designing robust habitat management & monitoring plans, and measuring biodiversity outcomes through monitoring and related research programmes, all of which form the backbone of the BNG policy.

Separate to the ecologists employed by central government – who continue to shape the biodiversity metric and its tools – ecologists may be employed by developers, off-site providers, and local governance actors. Recognising the underlying role of ecologists, the English government collaborated with industry bodies like the Chartered Institute of Ecology and Environmental Management (CIEEM) to prepare the sector for the transition to mandatory BNG. Training programmes, guidance documents, and professional accreditation systems were developed to ensure that ecologists could effectively contribute to BNG projects. CIEEM's involvement also helped to standardise methodologies for assessing biodiversity – such as assessing habitat conditions – with the aim that practices across the sector could be consistent and aligned with government policy.

Anecdotally, the advent of mandatory BNG has led to a surge in demand for ecologists and some have stated that there is a 'skills gap crisis' in ecology, driven partly by BNG. There is also a general request from the sector for further standardisation and guidance, such as with surveying techniques on particular types of habitats, like grasslands – which are subject to more discrepancy in baselining.

The government is working on solutions to address this lack of capacity with relevant industry bodies, such as CIEEM and the Association of Local Government Ecologists (ALGE).



Lessons learned

- Ensure there is a well resourced ecology sector with enough capacity within the region to support the BNG scheme, working with industry bodies to deliver training, guidance and accreditation.
- Work with industry bodies far in advance to prepare the sector for the specifics of the BNG model, including the use of the metric but also the robust design and monitoring of habitats over the long-term (30 years in England's BNG model).

Financial service providers

Financial service providers can play a role in the delivery of BNG. For example:

- offering repayable finance to meet the up-front costs of establishing BNG habitats,
- mitigating market risk of future prices by providing hedging or insurance products,
- creating endowment funds for the long-term management and maintenance of BNG habitats,
- offering specialist finance advice – such as on financial modelling or business operations relating to BNG.

In England, the interest from the financial sector is nascent but growing as mandatory BNG becomes more established – having been introduced in February 2024.

Anecdotally, some banks have been approached by organisations looking for funding for the purpose of setting up BNG habitat banks.⁴⁹ It has been acknowledged that there are a number of uncertainties in mandatory BNG, such as volumes of local demand, transaction costs and differences in legal agreements (set out in previous sections) that will need further clarity, before the finance sector can create and offer products and services at scale. However, as of October 2024 there have been some initial examples of lending within the BNG space.⁵⁰

Further to their role in supporting the mandatory BNG space, there have been some early discussions in using aspects of mandatory BNG on a wider, voluntary basis. For example, lenders that wish to incentivise sustainable activities across other sectors may wish to use adaptations of the statutory biodiversity metric within 'green lending', such as sustainability-linked loans. There have also been proposals to embed elements of BNG within the voluntary biodiversity credits market, which financiers have demonstrated interest.

BNG may be compared with the USA's major biodiversity compensation schemes for wetlands and protected species habitats. These have a combined revenue volume of USD 1.6B – USD 6.3B annually and draws in repayable finance from major institutional investors – including national pension funds. However, it should be noted that these schemes have been operational for over 30 years and have taken time to establish large volumes of investment.

⁴⁹ Habitat banks are off-site habitats that are established and secured before the point of unit sale to a developer. Within the BNG metric, habitat banking is incentivised through the 'time to condition' multiplier, which rewards the off-site provider with more units as a habitat becomes more established. This is to help minimise the time difference between the impact and the compensation of biodiversity loss.

⁵⁰ As an example of this, see [Triodos Bank Backs South West's Largest New Woodland in Decades](#).



Lessons learned

- Engage the finance sector within the jurisdiction of the potential BNG scheme to explore their potential role in supporting core stakeholders, including the provision of repayable finance, risk mitigation, and long-term financial management.

Technology providers

Technology providers can play a significant role in the implementation of BNG. For example, several companies in England have created software packages that aim to:

- digitise the baselining and habitat planning stages – including automatic identification of habitat parcels and their condition through remote sensing,
- provide ongoing monitoring capabilities for habitats over 30 years,
- streamline bureaucratic processes with BNG agreements, such as management of monitoring schedules and reporting,
- match developers and off-site providers, using automated exchange platforms.

In England, there has been some pushback by certain stakeholders – such as ecologists and academics – on the value of some of these services. For example, there is uncertainty about the accuracy of the automated and technology-based services that handle primary data, and their ability to replace ecologists in baselining and designing robust habitat plans.

Advocates of these services counter that, while the use of these services should be balanced with ecologists that can periodically ‘ground-truth’ biodiversity outcomes, these services are needed to make the BNG space efficient, scalable and accessible – for example by small-site developers that may not have the resources to pay for professional ecologists.

An example in England of a technology provider Verna’s ‘[Mycelia](#)’ software, which supports LPAs to manage their various BNG responsibilities in a more efficient way. It helps LPAs to quickly validate planning applications, provides decision support at the assessment stage (including automated checks of information in the biodiversity metric file), streamlines monitoring over the 30 years and enables one-click reporting – including templates for statutory reporting to central government. It was developed with input from 40 LPAs and was launched in November 2023. As of October 2024, it is being used by over 100 LPAs and additional 130 LPAs are in the process of obtaining the software.



Lessons learned

- Consider the potential use of technology to enhance efficiency and scalability within the practical delivery of BNG but balance their use with relevant expertise to make sure activities are scientifically robust.
 - For example, technology regulation or accreditation could be introduced to ensure that certain technology software is vetted before it is introduced.

Local communities

As previously mentioned, the English government did not actively seek out independent community-linked organisations in its development of BNG policy, but worked instead with LPAs to ensure local priorities could be factored into the delivery of BNG.

LPAs are led by locally elected officials and represent their communities' needs and desires through Local Plans, which are created in consultation with local communities. These are spatial plans on future development such as new schools, residential homes, green spaces, and transport links in certain areas.

LPAs must generally deliver on their BNG responsibilities in line with Local Plans. For individual development plans that are likely to have an impact on local communities, there is also a mandatory consultation period of 21 days, arranged by LPAs, where members of the public can theoretically question the developer's BNG plans. However, at this stage in the planning application process, there is typically very limited information on developers' BNG plans – which means less information for the public to scrutinise.

It should be noted that the vast majority of the public in England are not actively aware of BNG as a policy – though it is commented on in mainstream media. Members of the public may not have the requisite interest or knowledge to properly scrutinise BNG plans of developments. There is also a concern that this lack of awareness will impact the long-term management of BNG habitats that are near populations or urban pressures. For example, a fenced-off wildflower meadow next to a residential area may not be left alone by local residents, who instead may consider this space for its recreational or amenity value instead.

As of October 2024, Natural England is now working with the Institute of Development Studies on a 'social accountability and BNG' project to explore this factor in more depth.



Lessons learned

- Consider how local communities' needs and interests are represented within the BNG model, including how they are given the opportunity to influence plans for BNG delivery in their area.
 - Reflect on whether there are particular groups within communities that are at a particular disadvantage, such as those with less access to key information or knowledge of the BNG process, or less resourced groups that may struggle to advocate for themselves.
 - Depending on the social context of the area, this may mean efforts are required to educate and engage local communities on the process and value of committing habitats under a BNG scheme, and what this means in practice.



Conclusion

In conclusion, England's BNG model is the latest major example of how a biodiversity compensation scheme can help strike the balance between conservation and development, the need for which there is growing recognition in the global economy. Though the policy is in its early years, its analysis can help others to replicate, adapt and scale their own models to meet specific challenges – such as major infrastructure development or climate adaptation.

Globally, many organisations are working on a collective understanding of what a robust BNG scheme looks like. For example, the International Standards Organisation (ISO) is currently developing a global standard for designing and implementing BNG in development projects, drawing on the work of the BSI's own UK-based standard.

Beyond compliance or policy-based schemes, companies are now using different versions of biodiversity metrics to meet their own voluntary corporate commitments. This could present an opportunity for sectors and governments to harmonise their approaches and tie these efforts in with a broader governance structure, as England did with its property development sector.

Moving forward, future BNG models should build on the lessons learned from England and other biodiversity compensation policies to ensure both ecological and economic success. There must also be a balance between the benefits of regional approaches and standardisation, to align initiatives that work well on the ground with the achievement of global biodiversity targets, such as those within the Global Biodiversity Framework.



Appendices

Appendix A: Comparison of Regional and National Biodiversity Compensation Schemes

Throughout the body of this Guidebook, several biodiversity schemes around the world are referenced in comparison to England's BNG model. For ease, the most often compared schemes have been listed below with a brief description of their key features, including the scope of the schemes, the metrics employed, and overall governance structures.

We encourage readers to consider the possible modalities of BNG or biodiversity compensation models, building on these comparatives alongside England's BNG scheme.

Wetland Mitigation and Endangered Species Habitat Banking in the United States

The United States of America (USA) has two major biodiversity compensation schemes for wetlands and habitats linked to endangered species. Both schemes include a goal of No Net Loss. Though the underlying legislation – the Clean Water Act and the Endangered Species Act – has been in force since the 1970s, the mandatory offset component was not consistently enforced until the adoption of implementing regulations in 2008.

These two offset schemes are notable due to their size. The combined value of the off-site credit market is between USD 1.6B – USD 6.3B annually, with an area larger than 625,000 hectares legally secured in perpetuity, with endowment funds set up for long-term management. Due to the fact that off-site outcomes must first be proven before resulting credits are sold, the use of repayable finance plays a significant role in supporting the upfront costs of off-site compensation, with at least five international pension funds regularly investing in mitigation banks (see below).

Like England's BNG, companies impacting wetlands and endangered species habitat (such as government transportation and shipping agencies, and property/real estate development) must first avoid and minimise impact, in line with the mitigation hierarchy. They may then offset the residual impact with either on-site compensation or off-site compensation. Off-site compensation can be provided by either privately run mitigation banks or centralised compensation funds managed by non-profit or government entities, similar to England's statutory biodiversity credit scheme.

However, a notable difference is the preference in which these options are ordered. Companies are first incentivised to use ex-post (pre-established) habitats, such as through private mitigation banks and then rely on ex-post measures, such as new habitats established on-site. This preference was put into national policy in 2008, when ecological research found that the previous preference for on-site offsets were consistently poorer and less ecologically viable. Overall standards for on-site compensation have since been iterated, and on-site compensation now accounts for less than 20% of the schemes' outcomes.

For further information on Germany's biodiversity offsetting model, the following resources are available:

- [Compensatory Mitigation for Losses of Aquatic Resources; Final Rule \(2008\)](#), Environmental Protection Agency.
- [Endangered Species Act Compensatory Mitigation Policy \(2023\)](#), US Fish and Wildlife Service.

Biodiversity Offsetting in Germany

Biodiversity offsetting has been mandatory in Germany since the 1970s and works on a No Net Loss (NNL) basis. Like England's BNG, it targets the impact of land development, is delivered through the planning system and embeds the mitigation hierarchy as a core principle. Its local governance is also similar, with biodiversity offsetting carried out by regional states that follow national policy but are also given flexibility in how exact practices are carried out.

For example, regional states can use several metrics to calculate impacts and offsets for habitats/biomes, species, soil, water, air and climate (functions), as well as landscapes in terms of their aesthetic natural value, and in some cases their recreational value. This contrasts with England's BNG model that has one metric underpinned by national legislation that uses an 'area x quality' proxy for biodiversity.

Some studies have shown that a substantial proportion of offset habitats have failed to achieve their target condition due to restrictions on location that make it difficult to find suitable sites in practice, an absence of robust long-term monitoring, and general inconsistencies in how compensation sites are created. Amendments in the scheme over the last 30 or so years have included the introduction of habitat banking, allowing compensation sites to be established in advance and legally secured for 25-30 years.

For further information on Germany's biodiversity offsetting model, the following resources are available:

- [Biodiversity Offsetting in Germany](#), Institute for European Environmental Policy, 2022.
- [Biodiversity Offsets: European Perspectives on No Net Loss of Biodiversity and Ecosystem Services](#)" Wende et al., 2018.
- Biodiversity offsets: Effective Design and Implementation – [German Impact Mitigation Regulation in Hessen \(Chapter 6\)](#), OECD, 2016.

Native Vegetation Offsets in Victoria, Australia

In Victoria, Australia, native vegetation policy allows for the sale of offsets between property developers and local landowners, in the same bioregion and for the same type of vegetation that was cleared. The policy aims to achieve No Net Loss (NNL) for its native vegetation, including trees, shrubs, herbs and grasses. Gains may be generated from measures that protect the existing biodiversity from loss (averted loss gains), and those that restore or enhance the biodiversity (improvement gains).

Like England's BNG, the scheme uses a 'habitat x condition' method to assess the quality and extent of vegetation, quantified as General or Species Habitat Units (HUs). HUs are a measure of native vegetation extent and condition, and modelled scores for biodiversity or threatened species habitat. General HUs reflect the contribution a site makes to biodiversity in Victoria and Species HUs reflect the contribution a site makes to the persistence of threatened flora and fauna species.

Key features of the scheme include its use of a central register – BushBroker™ - that identifies landowners willing to preserve and manage native vegetation. A government representative of the BushBroker system then assesses the site and determines the number and type of units available. The BushBroker website notes that potential buyers of units would be able to search for credits on the Native Vegetation Credit Registry. However, in practice this is not a publicly accessible online database.

Another feature of the scheme is the allowance of averted loss gains. However, studies have found that the effectiveness of averted loss offsetting is highly limited, as the land parcels volunteered for the scheme have not been found to be at any risk of degradation – meaning a lack of additionality.

For further information on Victoria's native vegetation offset model, the following resources are available:

- [Offsets for the removal of native vegetation](#), Department for Energy, Environment and Climate Action, Victoria State Government.
- [Offsetting Native Vegetation Loss on Private Land: Independent assurance report to Parliament](#), Victorian Auditor-General's Office.

Fish Habitat Banking in Canada

Fish habitat banking has been operational in Canada since the 1990s and specifically aims to address the harmful impacts on fish habitats, including freshwater and marine fisheries. Though it is not mandated within legislation, it is underpinned by central policy. Schemes that affect fish habitats may be required to mitigate their impacts through fish habitat banking, depending on the type of development. The scope of the scheme is not limited to any one sector, and usually applies to developers, mining, energy companies and ports.

Like England's BNG, the scheme embeds the mitigation hierarchy in first avoiding harm and then using off-site habitats to compensate for any residual impact. The scheme is overseen by the Canadian Government's Department of Fisheries and Oceans (DFO), whose Minister must approve mitigation plans based on policy and guidance.

However, unlike England's BNG, the private companies that are causing the impact must carry out the works themselves – with plans approved centrally by the DFO. The conservation outcomes must also be achieved first before credits are earned and can be used, ensuring that improvements to habitats are achieved before any adverse impacts occur.

Third parties are prohibited from creating and selling from habitat banks. However, this policy is currently under review with a public consultation on modernising the scheme undertaken in 2022. The results of the public consultation, published in 2023, showed broad support for allowing for third-party offsetting, which could lead to the development of a broader market for habitat credits.⁵¹

⁵¹ Fisheries and Oceans Canada. "Fish and Fish Habitat Protection Programme: What we heard: Wave 2 Report". 2023

For further information on Canada's fish habitat banking model, the following resources are available:

- Fisheries and Oceans Canada (2023) [Fish and Fish Habitat Protection Program: What we heard wave 2 report](#).
- Fisheries and Oceans Canada (2021). [Interim Policy for Establishing Fish Habitat Banks to Support the Administration of the Fisheries Act and the Species at Risk Act](#)

Appendix B: Features of England's social, economic and political landscape suited for BNG.

The below features and aspects of England's political, economic, social and environmental landscape were considered important to the acceptability and success of implementing a BNG model.

- **Favourable views towards market-based mechanisms**

England's political and social culture fosters relatively positive attitudes towards market-based mechanisms within wider policy thinking. This was important for England's BNG model as one of its core features is the ability for property developers to buy biodiversity units from local off-site providers, such as farmers and estate owners, when they cannot achieve on-site gains.

In theory, the English government could have decided to impose a tax or tariff on developers and spend the funds on biodiversity compensation directly. However, the prevailing support for market-based mechanisms, particularly the use of local markets, encouraged England's BNG model to open the provision of off-site compensation to private and local landholders.

- **A depleted natural environment**

England is one of the most nature-depleted countries globally, ranking 234th out of the 240 countries in the Biodiversity Intactness Index (WCL, 2022). A Net Gain position to help address England's historic loss of biodiversity was favoured by BNG policy makers, politicians and public stakeholders. Some stakeholders – such as environmental Non-Governmental Organisations (eNGOs) have proposed higher biodiversity targets, such as 15-20% for certain regions within England.

- **A centralised planning system that underpins land use decisions**

Most of England's land development is permitted and managed through its planning system, which was largely centralised from 1947. Today, although planning is managed by LPAs, it operates within a framework of national policy, with the central government setting overarching planning guidelines through instruments like the National Planning Policy Framework (NPPF).

Before BNG, England's planning system already required property developers to use biodiversity compensation mechanisms – albeit on a much smaller scale, for certain protected species and habitats. This central system was seen as crucial for implementing BNG on a national level, because it allows for a level of uniformity in policy application across the country. Having an existing system within which to build BNG was also seen as convenient to avoid costs to government of creating new systems and governance actors, and prevent additional burdens on developers.

- **Higher population density and public access to nature**

England ranks within the top 40 most densely populated countries in the world (World Population Review, 2023).⁵²

England's spatially constrained land cover, combined with supportive social views of preserving public access to nature, led BNG policy makers to incorporate the spatial risk multiplier within the metric, which penalises developers for buying biodiversity units further away from the development site. This is to help maintain balances of habitat and greenspace cover within local areas, and not cause major imbalances in the distribution of off-site habitats that are created or restored across the country.

There are also steep differences in land prices in the UK that might have caused extreme regional imbalances without the spatial risk multiplier.

Other countries that have more and larger tracts of land for nature may choose not to incentivise the supply of compensation close to the point of impact.

- **Strong basis of civil society involvement in environmental conservation**

England has a strong foundation of civil society involvement in environmental conservation, driven by many local organisations and networks. For example, there are 47 local Wildlife Trusts and 65 Rivers Trusts in England. Many of these organisations fed into BNG consultations and policy development work, and have started to participate in the wider BNG space – such as offering advisory support or acting as off-site providers – now that the policy is operational.

⁵² According to the UK's Office for National Statistics, England has a population density of 438 per km².



Glossary

Adaptation, adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.¹

Afforestation is the establishment of the forest through planting and/or deliberate seeding on land that, until then, was under a different land use, it implies a transformation of land use from non-forest to forest.²

Ambient environment, non-resource environmental factors that modify the availability of resources or the ability of organisms to acquire them.³

Assets, a present economic resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity.⁴

Beyond value chain mitigation, mitigation action or investments that fall outside a company's value chain, including activities that avoid or reduce Greenhouse Gas (GHG) emissions, or remove and store GHGs from the atmosphere.⁵

Biobanking (habitat/species), measurable conservation outcome resulting from an exchange system (or market) where offset credits can be accumulated and sold to developers to compensate for their species or habitat impacts. Credits are tradable units of exchange defined by the ecological value associated with intentional changes or management of a natural habitat. Biobanking includes habitat banking and species banking and is usually focused on endangered habitats and species. Biobanking shares certain features with tradable permit schemes whereby an objective of no net loss of biodiversity is established and provides developers with flexibility to determine either to invest in their own compensation or offset or to purchase a credit that has been developed by others (environmental banks).⁶

¹ [TNFD Glossary, V2.0 June 2024](#), adapted from Fourth National Climate Assessment Glossary

² [TNFD Glossary, V2.0 June 2024](#), from FAO, On Definitions of Forest and Forest Change (2020)

³ [Global Ecosystem Topology \(IUCN\)](#), Glossary of selected terms

⁴ [TNFD Glossary, V2.0 June 2024](#), from International Financial Reporting Standard, Conceptual Framework: Elements of Financial Statements – Definitions and Recognition (2015)

⁵ [TNFD Glossary, V2.0 June 2024](#), from SBTi Beyond value chain mitigation

⁶ UNDP BIOFIN, [Catalogue of Finance Solutions](#)

Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity.⁷

Biological diversity / Biodiversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.⁸

Biomass, material of biological origin, excluding material embedded in geological formations and material transformed to fossilised material. Biomass includes organic material (both living and dead), such as trees, crops, grasses, tree litter, algae, animals, manure and waste of biological origin.⁹

Biome, global-scale zones, generally defined by the type of plant life that they support in response to average rainfall and temperature patterns e.g. tundra, coral reefs, or savannas.¹⁰

Biotope is as a well-defined geographical area, characterised by specific ecological conditions (soil, climate, etc.), which physically supports the organisms that live there (biocoenosis).¹¹

Capital flow and financing, access to capital markets, improved financing terms or financial products connected to the management of nature-related dependencies, impacts, risks, and opportunities.¹²

Catchment management agency is a national or regional government agency that has the authority to make decisions on the allocation of water. This includes catchment management authorities, water resource management agencies, and catchment municipality councils.¹³

Certification programme provides procured volumes of a product with an official document attesting to a status or level of achievement against a certain standard.¹⁴

Conservation, an action taken to promote the persistence of ecosystems and biodiversity.¹⁵

Conservation easements, a voluntary and legally-binding agreement, similar to a deed restriction, that permanently limits a property's uses in order to protect conservation values and achieve conservation goals.¹⁶

⁷ [TNFD Glossary, V2.0 June 2024](#), from Business and Biodiversity Offsets Programme (2012) Glossary, 2nd Updated Edition, CDP (2022) Forests Reporting Guidance, European Commission (2023) Directive 2022/2464 (CSRD)

⁸ [The Convention on Biological Diversity](#), Article 2. Use of Terms,

⁹ [TNFD Glossary, V2.0 June 2024](#), from ISO ISO 14021:2016 (2016)

¹⁰ [TNFD Glossary, V2.0 June 2024](#), from Keith A. et al. (2020) IUCN Global Ecosystem Typology 2.0 (2020)

¹¹ [TNFD Glossary, V2.0 June 2024](#), from European Environment Agency, EEA Glossary

¹² [TNFD Glossary, V2.0 June 2024](#)

¹³ [TNFD Glossary, V2.0 June 2024](#), adapted from Meissner, R., Stuart-Hill, S., Nakhoda, Z., The Establishment of Catchment Management Agencies in South Africa (2017)

¹⁴ [TNFD Glossary, V2.0 June 2024](#), adapted from CDP (2022) Forests Reporting Guidance

¹⁵ [TNFD Glossary, V2.0 June 2024](#), adapted from Levin, S. A. ed., The Princeton Guide to Ecology Princeton (2009)

¹⁶ [TNFD Glossary, V2.0 June 2024](#), from IPBES (2018)

Conversion is a change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.¹⁷

Critical habitat is any area of the planet with high biodiversity conservation significance, based on the existence of habitat of significant importance to critically endangered or endangered species, restricted range or endemic species, globally significant concentrations of migratory and/or congregatory species, highly threatened and/or unique ecosystems and key evolutionary processes.¹⁸

Debt-for-nature swaps, through debt restructuring agreements, governments are able to write off a proportion of their foreign held debt. The savings accrued will be channelled into domestic conservation initiatives and climate adaptation programmes. This often entails the establishment of a Conservation Trust Fund to channel the funds. Debt-for-nature swaps can target both official and commercial lending, with the former being the most common scheme.¹⁹

Deforestation is the loss of natural forest as a result of: (i) conversion to agriculture or other non-forest land use; (ii) conversion to a tree plantation; or (iii) severe and sustained degradation.²⁰

Degradation are changes within a natural ecosystem that significantly and negatively affect its species composition, structure, and/or function and reduce the ecosystem's capacity to supply products, support biodiversity, and/or deliver ecosystem services. Degradation may be considered conversion if it: is large-scale and progressive or enduring; alters ecosystem composition, structure, and function to the extent that regeneration to a previous state is unlikely; or leads to a change in land use (e.g., to agriculture or other use that is not a natural forest or other natural ecosystem).²¹

Dependencies (on nature) are aspects of environmental assets and ecosystem services that a person or an organisation relies on to function. A company's business model, for example, may be dependent on the ecosystem services of water flow, water quality regulation and the regulation of hazards like fires and floods; provision of suitable habitat for pollinators, who in turn provide a service directly to economies; and carbon sequestration.²²

Double materiality has two dimensions, namely: impact materiality and financial materiality.²³

Downstream are all activities that are linked to the sale of products and services produced by the company. This includes the use and re-use of the product and its end of life, including recovery, recycling, and final disposal.²⁴

Drivers of nature change, all external factors that affect nature, anthropogenic assets, nature's contributions to people and good quality of life. They include institutions and governance systems and other indirect and direct drivers (both natural and anthropogenic).²⁵

¹⁷ [TNFD Glossary, V2.0 June 2024](#), from Accountability Framework initiative, Terms and Definitions (2020)

¹⁸ [TNFD Glossary, V2.0 June 2024](#), from International Finance Corporation, Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)

¹⁹ UNDP BIOFIN, [Catalogue of Finance Solutions](#)

²⁰ Shortened from [TNFD Glossary, V2.0 June 2024](#), from Accountability Framework initiative (Afi), Terms and Definitions (2024)

²¹ [TNFD Glossary, V2.0 June 2024](#), from Accountability Framework initiative, Terms and Definitions (2020)

²² [TNFD Glossary, V2.0 June 2024](#), adapted from Science Based Targets Network, SBTN Glossary of Terms (2023)

²³ [TNFD Glossary, V2.0 June 2024](#), from European Commission, Directive 2022/2464 (CSRD) (2023)

²⁴ [TNFD Glossary, V2.0 June 2024](#), adapted from Science Based Targets Network, SBTN Glossary of Terms (2023)

²⁵ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

Ecological corridor, a clearly defined geographical space that is governed and managed over the long term to maintain or restore effective ecological connectivity. The following terms are often used similarly: 'linkages,' 'safe passages', 'ecological connectivity areas', 'ecological connectivity zones', and 'permeability areas'.²⁶

Ecological / habitat connectivity, the degree to which the landscape facilitates the movement of organisms (animals, plant reproductive structures, pollen, pollinators, spores, etc.) and other environmentally important resources, such as nutrients and moisture, between similar habitats. Connectivity is hampered by fragmentation.²⁷

Ecological network (for conservation), a system of natural and semi-natural landscape elements designed and managed to maintain or restore ecological functions, conserve biodiversity, and facilitate sustainable natural resource use. It links core habitats, such as protected areas or other effective area-based conservation measures (OECMs), with ecological connectivity areas (e.g. ecological corridors) to enhance connectivity and genetic exchange, thus increasing the chances of survival of threatened species.²⁸

Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.²⁹

Ecosystem assets, a form of environmental assets that relate to diverse ecosystems. These are contiguous spaces of a specific ecosystem type characterised by a distinct set of biotic and abiotic components and their interactions.³⁰

Ecosystem condition, the quality of an ecosystem measured by its abiotic and biotic characteristics. Condition is assessed by an ecosystem's composition, structure, and function which, in turn, underpins the ecological integrity of the ecosystem, and supports its capacity to supply ecosystem services on an ongoing basis.³¹

Ecosystem connectivity, the degree to which the landscape facilitates the movement of organisms (animals, plant reproductive structures, pollen, pollinators, spores, etc.) and other environmentally important resources, such as nutrients and moisture, between similar habitats. Connectivity is hampered by fragmentation.³²

Ecosystem extent, area coverage of a particular ecosystem, usually measured in terms of spatial area.³³

Ecosystem function, the flow of energy and materials through the biotic and abiotic components of an ecosystem. This includes many processes such as biomass production, trophic transfer through plants and animals, nutrient cycling, water dynamics and heat transfer.³⁴

²⁶ [TNFD Glossary, V2.0 June 2024](#) from Hilty, J., et al., Guidelines for Conserving Connectivity through Ecological Networks and Corridors, IUCN (2020)

²⁷ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

²⁸ [TNFD Glossary, V2.0 June 2024](#) adapted from Bennett, G. and K.J. Mulongoy (2006).

²⁹ [The Convention on Biological Diversity, Article 2. Use of Terms](#)

³⁰ [TNFD Glossary, V2.0 June 2024](#) from Adapted from UN et al., System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA EA) (2021)

³¹ [TNFD Glossary, V2.0 June 2024](#) adapted from UN et al., System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA EA) (2021)

³² [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

³³ [TNFD Glossary, V2.0 June 2024](#) from United Nations et al. System of Environmental-Economic Accounting – Ecosystem Accounting (2021)

³⁴ [TNFD Glossary, V2.0 June 2024](#) from Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Global Assessment Report on Biodiversity and Ecosystem Services (2019)

Ecosystem Functional Group, a group of related ecosystems within a biome that share common ecological drivers, which in turn promote similar biotic traits that characterise the group. Derived from the top-down by subdivision of biomes.³⁵

Ecosystem health is used to describe the condition of an ecosystem, by analogy with human health. Note that there is no universally accepted benchmark for a healthy ecosystem. Rather, the apparent health status of an ecosystem can vary, depending upon which metrics are employed to assess it and which societal aspirations are driving the assessment.³⁶

Ecological integrity is defined as the system's capacity to maintain structure and ecosystem functions using processes and elements characteristic for its ecoregion.³⁷

Ecosystem services are functions of an ecosystem that directly or indirectly benefit human wellbeing. Specifically, ecosystem services include both portions of the natural capital itself, such as timber or fish, that are harvested from ecosystems as well as the flows of services, such as watershed protection or climate regulation, that can be derived from and rely on stocks of natural capital.³⁸

Endangered species are species considered to be facing a very high risk of extinction in the wild.³⁹

Environmental assets are the naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity.⁴⁰

Ex-situ conservation means the conservation of components of biological diversity outside their natural habitats.⁴¹

Extinction risk (species), threat status of a species and how activities/pressures may affect the threat status. The indicator may also measure change in the available habitat for a species as a proxy for impact on local or global extinction risk.⁴²

Final ecosystem services, when an ecological end-product transitions to being either an economic benefit or something that can be directly used or appreciated by people.⁴³

Forest, land spanning more than 0.5 hectares with trees higher than five meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Forest includes natural forests and tree plantations. For the purpose of implementing zero deforestation supply chain commitments, the focus is on preventing the conversion of natural forests.⁴⁴

³⁵ [The IUCN Global Ecosystem Typology](#)

³⁶ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

³⁷ [Biodiversity Credit Alliance: Glossary of terms](#), Definition of a biodiversity credit, issue n.3, from Dorren et al. (2004)

³⁸ UNDP BIOFIN, [The Little Book of Investing in Nature](#), from Daly and Farley, 2004; Voltaire and Royer (2004)

³⁹ [TNFD Glossary, V2.0 June 2024](#) adapted from International Union for Conservation of Nature, IUCN Red List Categories and Criteria: Version 3.1 (2012)

⁴⁰ [TNFD Glossary, V2.0 June 2024](#) from United Nations et al., System of Environmental-Economic Accounting – Ecosystem Accounting (2021)

⁴¹ [The Convention on Biological Diversity, Article 2. Use of Terms](#)

⁴² [TNFD Glossary, V2.0 June 2024](#) from European Commission, Annex 1 to the Commission Delegated Regulation, supplementing Directive 2013/34/EU (2023)

⁴³ [TNFD Glossary, V2.0 June 2024](#) from Finisdore, J. et al. (2020) The 18 Benefits of Using Ecosystem Services Classification Systems, Climate Disclosure Standards Board, Framework Application Guidance for Biodiversity-related Disclosures (2021)

⁴⁴ [TNFD Glossary, V2.0 June 2024](#) from FAO Forest Resources Assessment - Terms and Definitions, Accountability Framework Initiative Terms and Definitions (2020)

Forest degradation entails a reduction or loss of the biological or economic productivity and complexity of forest ecosystems resulting in the long-term reduction of the overall supply of benefits from forest, which includes wood, biodiversity and other products or services, provided that the canopy cover stays above 10%.⁴⁵

Forest ownership, generally refers to the legal right to freely and exclusively use, control, transfer, or otherwise benefit from a forest. Ownership can be acquired through transfers such as sales, donations, and inheritance.⁴⁶

Freshwater, all permanent and temporary freshwater bodies as well as saline water bodies that are not directly connected to the oceans.⁴⁷

Grassland can be broadly defined as areas dominated by grasses and other similar plant families, where there is a limited amount of trees or shrubs.⁴⁸

Habitat means the place or type of site where an organism or population naturally occurs.⁴⁹

Habitat fragmentation is a general term describing the set of processes by which habitat loss results in the division of continuous habitats into a greater number of smaller patches of lesser total and isolated from each other by a matrix of dissimilar habitats. Habitat fragmentation, which leads to a barrier effect, may occur through natural processes (e.g. forest and grassland fires, flooding) and through human activities (e.g. forestry, agriculture, urbanisation).⁵⁰

Habitat loss is the reduction in the amount of space where a particular species, or group of species can survive and reproduce.⁵¹

Hinterlands are a city's surrounding areas which receive high demand for resources and services from the city. The hinterland in a way is not limited by geographic proximity to the city, given the trend to procure services from an increasingly broad area. With the growth of cities and the parallel globalisations, the hinterlands are becoming international and global.⁵²

Indigenous Peoples are inheritors and practitioners of unique cultures and ways of relating to people and the environment, and have retained social, cultural, economic, and political characteristics that are distinct from those of the dominant societies in which they live. The UN Declaration on the Rights of Indigenous Peoples does not include a definition of Indigenous Peoples and self-identification as Indigenous is considered a fundamental criterion.⁵³

⁴⁵ [TNFD Glossary, V2.0 June 2024](#) from FAO and UNEP, The State of the World's Forests (2020)

⁴⁶ [TNFD Glossary, V2.0 June 2024](#) from FAO, Forest Resources Assessment - Terms and Definitions (2020)

⁴⁷ [TNFD Glossary, V2.0 June 2024](#) from The United States Geological Survey, Water Science Glossary of Terms, WHO (2017) Guidelines for Drinking-Water Quality (2018)

⁴⁸ [TNFD Glossary, V2.0 June 2024](#) from Bardgett, R.D. et al., Combatting Global Grassland Degradation. Nature Reviews Earth & Environment 2: 720–735 (2021)

⁴⁹ [The Convention on Biological Diversity, Article 2. Use of Terms](#)

⁵⁰ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

⁵¹ [TNFD Glossary, V2.0 June 2024](#) from UC Berkeley, Understanding Global Change

⁵² [TNFD Glossary, V2.0 June 2024](#) from Lee, S. E. et al., Advancing City Sustainability via Its Systems of Flows: The Urban Metabolism of Birmingham and Its Hinterland. Sustainability 8, 220 (2016)

⁵³ [Biodiversity Credit Alliance: Glossary of terms](#), Definition of a biodiversity credit, issue n.3 from United Nations Department of Environmental and Social Affairs

Indigenous Peoples and Local Communities Conserved Territories and Areas (ICCAs), natural and/or modified ecosystems containing significant biodiversity values and ecological services, voluntarily conserved by (sedentary and mobile) Indigenous and local communities, through customary laws or other effective means.⁵⁴

Indigenous rights, Indigenous Peoples' human rights are protected by a multitude of instruments, declarations, jurisprudence, and authoritative interpretations developed by international and regional human rights mechanisms. Those rights are most clearly articulated through The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) which expresses and reflects legal commitments under the Charter of the United Nations, as well as treaties, judicial decisions, principles, and customary international law.⁵⁵

Indigenous (=native) species, a species or lower tax on living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems.⁵⁶

In-situ conditions are conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.⁵⁷

In-situ conservation means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.⁵⁸

Key Biodiversity Area, a site contributing significantly to the global persistence of biodiversity.⁵⁹

Land includes all dry land, its vegetation cover, nearby atmosphere, and substrate (soils, rocks) to the rooting depth of plants, and associated animals and microbes.⁶⁰

Landfilling refers to the final depositing of solid waste at, below or above ground level at engineered disposal sites.⁶¹

Land use change is the transformation from one land use category (e.g., cropland, grassland, forest/woodland, urban/industrial, wetland/tundra) to another category (e.g., transformation from natural forest to cropland).⁶²

⁵⁴ [Biodiversity Credit Alliance: Glossary of terms](#), Definition of a biodiversity credit, issue n.3 from World Parks Congress (2003)

⁵⁵ [Biodiversity Credit Alliance: Glossary of terms](#), Definition of a biodiversity credit, issue n.3 from Expert Mechanism on the Rights of Indigenous Peoples (2017)

⁵⁶ [TNFD Glossary, V2.0 June 2024](#) from International Council for the Exploration of the Sea, Glossary of Terms (2022)

⁵⁷ [The Convention on Biological Diversity, Article 2. Use of Terms](#)

⁵⁸ Ibid.

⁵⁹ [TNFD Glossary, V2.0 June 2024](#) from International Union for Conservation of Nature, A Global Standard for the Identification of Key Biodiversity Areas: Version 1.0 (2016)

⁶⁰ [TNFD Glossary, V2.0 June 2024](#) from IUCN, Global Ecosystem Typology (2023)

⁶¹ [TNFD Glossary, V2.0 June 2024](#) from GRI (2022) GRI Standards Glossary from UN, Glossary of Environment Statistics, Studies in Methods, Series F, No. 67 (1997)

⁶² [TNFD Glossary, V2.0 June 2024](#) from SBTi (2023) Forest, land and agriculture science- based target-setting guidance and IPCC, Annex I: Glossary (2019)

Local Communities is a term used based on the characteristic listed by the Convention on Biological Diversity and its article 8 (j) which refer to: 'Local communities embodying traditional lifestyles relevant for the conservation and sustainable of biological diversity'. Local Communities living in rural and urban areas of various ecosystems may exhibit some of the following characteristics:

- Self-identification as a local community;
- Lifestyles linked to traditions associated with natural cycles (symbiotic relationships or dependence), the use of and dependence on biological resources and linked to the sustainable use of nature and biodiversity;
- The community occupies a definable territory traditionally occupied and/or used, permanently or periodically. These territories are important for the maintenance of social, cultural, and economic aspects of the community;
- Traditions (often referring to common history, culture, language, rituals, symbols and customs) and are dynamic and may evolve;
- Technology/knowledge/innovations/practices associated with the sustainable use and conservation of biological resources;
- Social cohesion and willingness to be represented as a local community;
- Traditional knowledge transmitted from generation to generation including in oral form;
- A set of social rules (e.g., that regulate land conflicts/sharing of benefits) and organisational-specific community/traditional/customary laws and institutions;
- Expression of customary and/or collective rights;
- Self-regulation by their customs and traditional forms of organization and institutions;
- Performance and maintenance of economic activities traditionally, including for subsistence, sustainable development and/or survival;
- Biological (including genetic) and cultural heritage (bio-cultural heritage);
- Spiritual and cultural values of biodiversity and territories;
- Culture, including traditional cultural expressions captured through local languages, highlighting common interest and values;
- Sometimes marginalised from modern geopolitical systems and structures;
- Biodiversity often incorporated into traditional place names;
- Foods and food preparation systems and traditional medicines are closely connected to biodiversity/environment;
- May have had little or no prior contact with other sectors of society resulting in distinctness or may choose to remain distinct;
- Practice of traditional occupations and livelihoods;
- May live in extended family, clan or tribal structures;
- Belief and value systems, including spirituality, are often linked to biodiversity;
- Shared common property over land and natural resources;
- Traditional right holders to natural resources;
- Vulnerability to outsiders and little concept of intellectual property rights.⁶³

Mandatory market credit schemes enable businesses, governments, non-profit organisations, universities, municipalities, and individuals to offset their impacts on biodiversity. In a compliance market, trading and demand is created by a regulatory mandate.⁶⁴

⁶³ Shortened from [TNFD Glossary, V2.0 June 2024](#) from Report of the Expert Group Meeting of Local Community Representatives within the Context of Article 8(j) and Related Provisions of the Convention on Biological Diversity 1 Territory is interpreted as lands and waters

⁶⁴ [TNFD Glossary, V2.0 June 2024](#) adapted from Carbon Offset Research and Education Program Carbon Offset Guide

Mitigation hierarchy (and conservation hierarchy) is the sequence of actions to anticipate and avoid, and where avoidance is not possible, minimise, and, when impacts occur, restore, and where significant residual impacts remain, offset for biodiversity-related risks and impacts on affected communities and the environment. The conservation hierarchy goes beyond mitigating impacts, to encompass any activities affecting nature. This means that conservation actions to address historical, systemic, and non-attributable biodiversity loss can be accounted for in the same framework as actions to mitigate specific impacts.⁶⁵

Natural Capital refers to “the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people.”⁶⁶

Naturally regenerating forest, forest predominantly composed of trees established through natural regeneration.⁶⁷

Nature, the natural world, with an emphasis on the diversity of living organisms (including people) and their interactions among themselves and with their environment.⁶⁸

Nature-based revenue model, mechanism which can attract commercial investments - i.e. investments linked to commercial terms, such as market-rate returns, and/or commercially acceptable tenor - to enable 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 (defined as nature-based solutions).⁶⁹

Nature-based solutions, actions to protect, conserve, restore, sustainably use, and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems that address societal, economic, and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.⁷⁰

Nature positive is a global societal goal defined as ‘halt and reverse nature loss by 2030 on a 2020 baseline, and achieve full recovery by 2050’. Nature positive is a global and societal goal. Individual entities, geographies and countries can and must demonstrate their sufficient contribution to a global nature-positive outcome. In operationalising nature positive, tackling drivers and the negative and positive impacts is central. Companies and financial institutions can contribute to the Nature Positive goal by taking these high-level actions: Assess their material impacts, dependencies, risks and opportunities; shift their business strategy and models; commit to science-based targets for nature; report their nature-related issues to investors and other stakeholders; transform by avoiding and reducing negative impacts, restoring, and regenerating nature; collaborate across land, seascapes and river basins; and advocate to governments for policy ambition.⁷¹

⁶⁵ [TNFD Glossary, V2.0 June 2024](#) adapted from Cross Sector Biodiversity Initiative (2015) and Science Based Targets Network, Step 4. Act (2023)

⁶⁶ UNDP BIOFIN, [The Little Book of Investing in Nature](#), from the Natural Capital Coalition

⁶⁷ [TNFD Glossary, V2.0 June 2024](#) from FAO, Forest Resources Assessment - Terms and Definitions (2020)

⁶⁸ [TNFD Glossary, V2.0 June 2024](#) adapted from Díaz, S et al., The IPBES Conceptual Framework – Connecting Nature and People (2015)

⁶⁹ From WWF and South Pole, [Common Success Factors for Bankable Nature-based Solutions](#), (2022)

⁷⁰ [TNFD Glossary, V2.0 June 2024](#) adapted from IUCN, The IUCN Global Standard for Nature-based Solutions (2020)

⁷¹ [TNFD Glossary, V2.0 June 2024](#) from Nature Positive Initiative (2023)

Nature-related physical risks are risks resulting from the degradation of nature (such as changes in ecosystem equilibria, including soil quality and species composition) and consequential loss of ecosystem services that economic activity depends upon. These risks can be chronic (e.g. a gradual decline of species diversity of pollinators resulting in reduced crop yields, or water scarcity) or acute (e.g. natural disasters or forest spills). Nature-related physical risks arise as a result of changes in the biotic (living) and abiotic (non-living) conditions that support healthy, functioning ecosystems. These risks are usually location-specific.⁷²

Net gain is the point at which project-related impacts on biodiversity and ecosystem services are outweighed by measures taken according to the mitigation hierarchy, so that a net gain results. May also be referred to as net positive impact.⁷³

No net loss is defined as the point at which project-related impacts are balanced by measures taken through application of the mitigation hierarchy, so that no loss remains.⁷⁴

Nutrient trading, measurable conservation outcome resulting from a trading system (or market) where nutrient reduction credits are established and traded. These credits can have a monetary value that may be paid to the seller for utilising management practices that reduce nitrogen, phosphorous, or sediment. In general, water quality trading utilizes a market-based approach that allows one source of water pollution to maintain its regulatory obligations by using pollution reductions created by another source. Trades can take place between point sources (e.g. wastewater treatment plants), between point and nonpoint sources (e.g. a wastewater treatment plant and a farming operation) or between nonpoint sources (such as agriculture and urban stormwater sites or systems). Systems can be voluntary or compliance.⁷⁵

Ocean, all connected saline ocean waters characterised by waves, tides, and currents.⁷⁶

Payment for ecosystem services (PES) is a type of market-based instrument that is increasingly used to finance nature conservation. Payment of ecosystem services programmes allow for the translation of the ecosystem services that ecosystems provide for free into financial incentives for their conservation, targeted at the local actors who own or manage the natural resources.⁷⁷

Peat is a deposit of partially decayed organic matter in the upper soil horizons.⁷⁸

Pesticide, any substance intended for preventing, destroying, attracting, repelling, or controlling any pest including unwanted species of plants or animals during the production, storage, transport, distribution and processing of food, agricultural commodities, or animal feeds or which may be administered to animals for the control of ectoparasites. The term includes substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport. The term normally excludes fertilisers, plant and animal nutrients, food additives, and animal drugs.⁷⁹

Plantation forest is defined as planted forest that is intensively managed and meets all the following criteria at planting and stand maturity: one or two species, even age class and regular spacing.⁸⁰

⁷² [TNFD Glossary, V2.0 June 2024](#)

⁷³ [TNFD Glossary, V2.0 June 2024](#) from Cross-Sector Biodiversity Initiative (2015) A Cross-sector Guide for Implementing the Mitigation Hierarchy

⁷⁴ Ibid

⁷⁵ UNDP BIOFIN, [Catalogue of Finance Solutions](#)

⁷⁶ [TNFD Glossary, V2.0 June 2024](#)

⁷⁷ Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), [Policy Instrument](#), Retrieved 11 September 2024

⁷⁸ [Global Ecosystem Topology \(IUCN\)](#), Glossary of selected terms

⁷⁹ [TNFD Glossary, V2.0 June 2024](#) from FAO & WHO, Codex Alimentarius Commission Procedural Manual (2019)

⁸⁰ [TNFD Glossary, V2.0 June 2024](#) from FAO, Forest Resources Assessment – Terms and Definitions (2020)

Primary forest is a naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities, and the ecological processes are not significantly disturbed.

Explanatory notes:

1. Includes both pristine and managed forests that meet the definition.
2. Includes forests where Indigenous Peoples engage in traditional forest stewardship activities that meet the definition.
3. Includes forests with visible signs of abiotic damages (such as storm, snow, drought, and fire) and biotic damages (such as insects, pests, and diseases).
4. Excludes forests where hunting, poaching, trapping or gathering have caused significant native species loss or disturbance to ecological processes.
5. Examples of key characteristics of primary forests:
 - They show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;
 - The area is large enough to maintain its natural ecological processes;
 - There has been no known significant human intervention, or the last significant human intervention was long enough ago to have re-established natural species composition and processes.⁸¹

“Prior and informed consent” or “free, prior and informed consent” or “approval and involvement” free implies that indigenous peoples and local communities are not pressured, intimidated, manipulated or unduly influenced and that their consent is given, without coercion. Prior implies seeking consent or approval sufficiently in advance of any authorisation to access traditional knowledge respecting the customary decision-making processes in accordance with national legislation and time requirements of Indigenous peoples and local communities. Informed implies that information is provided that covers relevant aspects, such as: the intended purpose of the access; its duration and scope; a preliminary assessment of the likely economic, social, cultural and environmental impacts, including potential risks; personnel likely to be involved in the execution of the access; procedures the access may entail and benefit-sharing arrangements. Consent or approval is the agreement of the Indigenous peoples and local communities who are holders of traditional knowledge or the competent authorities of those Indigenous peoples and local communities, as appropriate, to grant access to their traditional knowledge to a potential user and includes the right not to grant consent or approval. Involvement refers to the full and effective participation of Indigenous peoples and local communities, in decision-making processes related to access to their traditional knowledge. Consultation and full and effective participation of Indigenous peoples and local communities are crucial components of a consent or approval process.⁸²

Protected area, a clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.⁸³

Realm, one of five major components of the biosphere that differ fundamentally in ecosystem organisation and function: terrestrial, freshwater, marine, subterranean, atmospheric and combinations of these (transitional realms). Because variation in nature is continuous, we also include transitional realms, where the realms meet and have their own unique organisation and function.⁸⁴

Reforestation is the conversion to forest of land that has previously contained forests but that has been converted to some other use.⁸⁵

⁸¹ Ibid.

⁸² [TNFD Glossary, V2.0 June 2024](#) from Convention on Biological Diversity, Glossary of Relevant Terms (2018)

⁸³ [TNFD Glossary, V2.0 June 2024](#) from IUCN, Guidelines for Applying Protected Area Management Categories (2018)

⁸⁴ [The IUCN Global Ecosystem Typology](#)

⁸⁵ [TNFD Glossary, V2.0 June 2024](#) adapted from the IPCC, Annex I: Glossary (2019)

Regenerative agriculture, there is no scientific consensus definition of regenerative agriculture; rather there are process (use of cover crops, reduced tillage, etc.), principle and outcome-based definitions (improved soil health, etc.). The most cited outcomes as part of a definition of regenerative agriculture in scientific literature include improved soil health, increased carbon sequestration and increase in biodiversity.⁸⁶

Rehabilitation refers to restoration activities that move a site towards a natural state baseline in a limited number of components (i.e. soil, water, and/or biodiversity), including natural regeneration, conservation agriculture, and emergent ecosystems.⁸⁷

Resilience is defined as having the capacity to live and develop with change and uncertainty. It provides capacities for turning risks into opportunities. This includes: (1) adaptive capacities to absorb shocks and turbulence and avoid unpleasant tipping points, thresholds, and regime shifts; (2) capacities to prepare for, learn from, and navigate uncertainty and surprise; (3) capacities for keeping options alive and creating space for innovation; and (4) capacities for systemic transformation in the face of crises and unsustainable development pathways and traps.⁸⁸

Resources, five fundamental resources in the environment that are essential to sustaining all life: water, nutrients, oxygen, carbon, and energy.⁸⁹

Restoration is any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state. Active restoration includes a range of human interventions aimed at influencing and accelerating natural successional processes to recover biodiversity ecosystem service provision. Passive restoration includes reliance primarily on natural process of ecological succession to restore degraded ecosystems, but may include measures to protect a site from processes that currently prevent natural recovery (e.g. protection of degraded forests from overgrazing by livestock or unintentional human-induced fire).⁹⁰

Restoration status is characterised by three phases described as the following:

- In preparation: [resources], funds committed, area [designated] for restoration, activities have not yet begun, and impacts of restoration may not yet be measurable.
- In progress: ongoing restoration activities and depending on the time that the activities have been ongoing, impacts may start to be measurable.
- Post-completion monitoring: restoration activities completed and efforts in place to monitor the restoration results.⁹¹

Rewetted, all deliberate actions that aim to bring the water table of a drained peatland (i.e. the position relative to the surface) back to that of the original, peat-forming peatland. When this goal has been reached, the peatland is 'rewetted'.⁹²

⁸⁶ Shortened from [TNFD Glossary, V2.0 June 2024](#) from Newton et al., What is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes, *Front Sust.* (2020)

⁸⁷ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

⁸⁸ [TNFD Glossary, V2.0 June 2024](#) from Folke, C. et al. (2016) Social-Ecological Resilience and Biosphere-Based Sustainability Science, *Ecology and Society*; Rockström, J. et al. Krishnan, L. Warszawski, and D. Nel., Shaping a Resilient Future in Response to COVID-19, *Nature Sustainability* (2023)

⁸⁹ [Global Ecosystem Topology \(IUCN\)](#), Glossary of selected terms

⁹⁰ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

⁹¹ [TNFD Glossary, V2.0 June 2024](#) from CBD, Guidance on using the indicators of the monitoring framework of the Kunming-Montreal Global Biodiversity Framework (2024)

⁹² [TNFD Glossary, V2.0 June 2024](#) from Ramsar Convention, Global Guidelines for Peatland Rewetting and Restoration (2021)

Rewilding aims to restore ecosystems and reverse biodiversity declines by allowing wildlife and natural processes to reclaim areas no longer under human management. Well-applied rewilding can restore ecosystems at a landscape scale, help mitigate climate change, and provide socio-economic opportunities for communities. Evidence-based rewilding principles will guide practitioners to rewild safely, help assess the effectiveness of projects, and incorporate rewilding into global conservation targets.⁹³

Semi-natural forest is a forest of native species, established through planting, seeding, or assisted natural regeneration. Explanatory notes:

1. Includes areas under intensive management where native species are used and deliberate efforts are made to increase/optimize the proportion of desirable species, leading to changes in the structure and composition of the forest.
2. Naturally regenerated trees from species other than those planted or seeded may be present.
3. May include areas with naturally regenerated trees of introduced species.
4. Includes areas under intensive management where deliberate efforts, such as thinning or fertilising, are made to improve or optimise desirable functions of the forest. These efforts may lead to changes in the structure and composition of the forest.⁹⁴

Soil degradation, a change in soil health status, resulting in a diminishing capacity of the ecosystem to provide goods and services for its beneficiaries. The main types of soil degradation are defined by four categories: 1) soil erosion, 2) soil fertility reduction, 3) soil fertility reduction, 4) soil salinisation, 5) waterlogging.⁹⁵

Soil fertility is defined as the ability of a soil to sustain plant growth by providing essential plant nutrients and favourable chemical, physical and biological characteristics as a habitat for plant growth.⁹⁶

Soil carbon stocks express a balance between organic inputs and their stepwise decomposition by soil biota. The stock (tC ha⁻¹) can be estimated as the sum over annual inputs (tC ha⁻¹ year⁻¹) multiplied with mean residence time (year) similar to tree cover transition.⁹⁷

Soil salinisation is an increase in the salt content of the soil, often as a result of irrigation practices. Excess salt uptake hinders crop growth by obstructing the ability to uptake water, causing loss of soil fertility and desertification.⁹⁸

Species are a fundamental category for the classification and description of organisms, defined in various ways but typically on the basis of reproductive capacity; i.e. the members of a species can reproduce with each other to produce fertile offspring but cannot do so with individuals outside the species.⁹⁹

Species extinction risk, threat status of a species and how activities/pressures may affect the threat status. The indicator may also measure change in the available habitat for a species as a proxy for impact on local or global extinction risk.¹⁰⁰

⁹³ [TNFD Glossary, V2.0 June 2024](#) from IUCN Issue Brief: The Benefits and Risks of Rewilding (2021)

⁹⁴ [TNFD Glossary, V2.0 June 2024](#) from FAO, Global Forest Resources Assessment Update (2005)

⁹⁵ [TNFD Glossary, V2.0 June 2024](#) from FAO, Guidance on Core Indicators for Agrifood Systems: Measuring the Private Sector's Contribution to the Sustainable Development Goals (2021)

⁹⁶ [TNFD Glossary, V2.0 June 2024](#) from FAO, Global Soils Partnership

⁹⁷ [TNFD Glossary, V2.0 June 2024](#) from Van Noordwijk M, Climate Change: Agricultural Mitigation, Encyclopedia of Agriculture and Food Systems (2014)

⁹⁸ [TNFD Glossary, V2.0 June 2024](#) from Kumar and Droby, Microbial Management of Plant Stresses (2021)

⁹⁹ [TNFD Glossary, V2.0 June 2024](#) from Levin, S. A. ed., The Princeton Guide to Ecology (2009)

¹⁰⁰ [TNFD Glossary, V2.0 June 2024](#) from European Commission Directive 2022/2464 (CSRD)

Stressed watersheds are watersheds, where the demand for water exceeds the available amount during a certain period, or when poor quality restricts its use. Water stress freshwater resources to deteriorate in quantity (aquifer over-exploitation, dry rivers, etc.) and quality (eutrophication, organic matter pollution, saline intrusion, etc.).¹⁰¹

Structural connectivity for species, a measure of habitat permeability based on the physical features and arrangements of habitat patches, disturbances, and other land, freshwater or seascape elements presumed to be important for organisms to move through their environment. Structural connectivity is used in efforts to restore or estimate functional connectivity where measures of it are lacking.¹⁰²

Supply chain, the linear sequence of processes, actors, and locations involved in the production, distribution, and sale of a commodity from start to finish.¹⁰³

Sustainable forest management, a dynamic and evolving concept, intended to maintain and enhance the economic, social, and environmental value of all types of forests for the benefit of present and future generations, considering the following seven thematic elements as a reference framework:

1. extent of forest resources;
2. forest biodiversity;
3. forest health and vitality;
4. productive functions of forest resources;
5. protective functions of forest resources;
6. socio-economic functions of forests; and
7. legal, policy and institutional framework.¹⁰⁴

Sustainable use means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.¹⁰⁵

Third party certification standards, a third party with no stake in the business has determined that the final product complies with specific standards for safety, quality, or performance.¹⁰⁶

Threatened ecosystem is an ecosystem assessed as facing a high risk of collapse in the medium-term.¹⁰⁷

Threatened species, species assessed as facing a high risk of extinction in the wild in the medium-term. This includes flora and fauna listed in the International Union for Conservation of Nature (IUCN) Red List.¹⁰⁸

Threshold (ecological), the point at which a relatively small change in external conditions causes a rapid change in an ecosystem. When an ecological threshold has been passed, the ecosystem may no longer be able to return to its state by means of its inherent resilience.¹⁰⁹

¹⁰¹ [TNFD Glossary, V2.0 June 2024](#) adapted from European Environment Agency, Environment in the European Union at the Turn of the Century (1999)

¹⁰² [TNFD Glossary, V2.0 June 2024](#) from Hilty, J. et al. (2019) Corridor Ecology: Linking Landscapes for Biodiversity Conservation and Climate Adaptation. 2nd ed. Washington, DC: Island Press; as cited in Hilty, J. et al., Guidelines for Conserving Connectivity through Ecological Networks and Corridors. Best Practice Protected Area Guidelines Series No. 30 (2020)

¹⁰³ [TNFD Glossary, V2.0 June 2024](#) from Task Force on Climate-related Financial Disclosures, Guidance on Scenario Analysis for Non-Financial Companies (2020)

¹⁰⁴ [TNFD Glossary, V2.0 June 2024](#) from FAO, Sustainable Forest Management

¹⁰⁵ [The Convention on Biological Diversity, Article 2. Use of Terms](#)

¹⁰⁶ [TNFD Glossary, V2.0 June 2024](#) from FAO, Environmental and Social Standards, Certification and Labelling for Cash Crops (2003)

¹⁰⁷ [TNFD Glossary, V2.0 June 2024](#) from IUCN, Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria (2017)

¹⁰⁸ [TNFD Glossary, V2.0 June 2024](#) from IUCN Red List categories and criteria (2012)

¹⁰⁹ [TNFD Glossary, V2.0 June 2024](#) from IPBES Glossary

Total surface area owned or leased, a clearly defined geographical space which an entity has the power to govern financially and operationally so as to obtain benefits from its activities.¹¹⁰

Traditional knowledge is the knowledge, innovations, and practices of Indigenous and Local Communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity.¹¹¹

Tree cover loss, conversion of a tree-dominated land use type to a non-tree-dominated land use type. Note that deforestation is included in this, but that not all tree cover loss is deforestation, as it could also include tree cover loss within commercial forest plantations.¹¹²

Upstream, all activities associated with suppliers, such as production or cultivation, sourcing of commodities or goods, and the transportation of commodities to manufacturing facilities.¹¹³

Valuation, the process of estimating the relative importance, worth, or usefulness of natural capital to people (or to a business), in a particular context. Valuation may involve qualitative, quantitative, or monetary approaches, or a combination of these.¹¹⁴

Value at Risk is a measure of a potential loss in a portfolio, which estimates how much a set of investments might lose at a maximum, with a given probability (e.g. 99.5%, 99.9%), in a set time period. It requires estimation of the probability distribution for the changes in the value of the portfolio.¹¹⁵

Value chain, the full range of interactions, resources and relationships related to a reporting entity's business model and the external environment in which it operates. A value chain encompasses the interactions, resources and relationships an entity uses and depends on to create its products or services from conception to delivery, consumption and end-of-life, including interactions, resources and relationships in the entity's operations, such as human resources; those along its supply, marketing and distribution channels, such as materials and service sourcing, and product and service sale and delivery; and the financing, geographical, geopolitical and regulatory environments in which the entity operates.¹¹⁶

Voluntary credit markets enable businesses, governments, non-profit organizations, universities, municipalities, and individuals to offset their impacts on biodiversity outside a regulatory regime. Trading and demand in the voluntary market are created only by voluntary buyers (corporations, institutions, and individuals).¹¹⁷

Water catchment (also known as a watershed or basin) is an area of land where all water flows and is directed into a single stream or river. Natural boundaries of water catchments can vary in scale and can be very small for a single stream or river, or very broad for a large river such as the Amazon or Congo Rivers. Land and freshwater use in a watershed can affect the entire length of river depending on the intensity of the use and impact.¹¹⁸

¹¹⁰ [TNFD Glossary, V2.0 June 2024](#)

¹¹¹ [TNFD Glossary, V2.0 June 2024](#) from Convention on Biological Diversity, Glossary of Relevant Terms (2018)

¹¹² [TNFD Glossary, V2.0 June 2024](#)

¹¹³ [TNFD Glossary, V2.0 June 2024](#) from Science Based Targets Network, SBTN Glossary of Terms (2023)

¹¹⁴ [TNFD Glossary, V2.0 June 2024](#) from Capitals Coalition, Natural Capital Protocol (2016)

¹¹⁵ [TNFD Glossary, V2.0 June 2024](#) from Task Force on Climate- Related Financial Disclosures, Forward-Looking Financial Sector Metrics (2020)

¹¹⁶ [TNFD Glossary, V2.0 June 2024](#) from International Financial Reporting Standard, S1 General Requirements for Disclosure of Sustainability-related Financial Information (2023)

¹¹⁷ [TNFD Glossary, V2.0 June 2024](#) adapted from Carbon Offset Research and Education Program Carbon Offset Guide

¹¹⁸ [TNFD Glossary, V2.0 June 2024](#) adapted from Freshwater Information Platform

Water quality, the biological, chemical, and physical properties of water, often assessed against a usage standard, such as whether its quality can support freshwater biodiversity, be used for drinking water for people, or irrigation. Note that standards and definitions of water quality vary across use cases.¹¹⁹

Water scarcity refers to the volumetric abundance, or lack thereof, of freshwater resources. Scarcity is human driven; it is a function of the volume of human water consumption relative to the volume of water resources in a given area. As such, an arid region with very little water, but no human water consumption would not be considered scarce, but rather arid. Water scarcity is a physical, objective reality that can be measured consistently across regions and over time. Water scarcity reflects the physical abundance of freshwater rather than whether that water is suitable for use. For instance, a region may have abundant water resources (and thus not be considered water scarce), but have such severe pollution that those supplies are unfit for human or ecological uses.¹²⁰

Water sources include water withdrawn from surface water, groundwater, seawater, produced water and third-party water.¹²¹

Water stress (areas of) is formally defined as the ability, or lack thereof, to meet human and ecological demands for water. Water stressed (region): defined in three levels: 25%, below which no water scarcity exists; 60%, indicating approaching scarcity; 75%, above which strong water scarcity is identified. Anything above the 60% figure, approaching scarcity, is considered 'water stressed'.¹²²

Wetland banking, measurable conservation outcome resulting from a trading system (or market) where offset credits are tradable units of exchange defined by the ecological value associated with verifiable changes and management of a natural wetland habitat. A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored and preserved for the purpose of providing compensation for expected adverse impacts to similar ecosystems nearby. The value of a bank is defined in compensatory mitigation credits that can be traded or sold. Most systems are designed for no net loss of wetlands even following residual development impacts.¹²³

Wild species refers to populations of any native species that have not been domesticated through multigenerational selection for particular traits, and which can survive independently of human intervention that may occur in any environment. This does not imply a complete absence of human management and recognises various intermediate states between wild and domesticated.¹²⁴

¹¹⁹ [TNFD Glossary, V2.0 June 2024](#) from UNEP, Water Quality Index for Biodiversity Technical Development Document (2008)

¹²⁰ [TNFD Glossary, V2.0 June 2024](#) from The CEO Water Mandate (2014) Corporate Water Disclosure Guidelines, European Commission, Annex 2 to the Commission Delegated Regulation, supplementing Directive 2013/34/EU as amended by Directive 2022/2464 (CSRD), as regards sustainability reporting standards (2023)

¹²¹ [TNFD Glossary, V2.0 June 2024](#) from GRI, GRI 303: Water and Effluents (2018)

¹²² [TNFD Glossary, V2.0 June 2024](#) adapted from UN Water (2021) Summary Progress Update 2021: SDG 6 — water and sanitation for all and WWF, Contextual Water Targets: A Practical Guide to Setting Contextual Corporate- and Site-level Water Targets (2021)

¹²³ UNDP BIOFIN, [Catalogue of Finance Solutions](#)

¹²⁴ [TNFD Glossary, V2.0 June 2024](#) from IPBES Sustainable Use of Wild Species Assessment, Chapter 1 (2022)



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