

Biodiversity net gain



Overview

- In 2024, mandatory biodiversity net gain (BNG) was introduced as a planning requirement. This is a new process that requires the habitats lost on a development site to be accounted for and losses addressed.
- On the development site, patches of differing vegetation types, such as woodland, are mapped. Data on their size, ecology and location are used to derive 'biodiversity units'. This involves the use of metrics set out in legislation and supplied in spreadsheets.
- A biodiversity gain plan must be submitted showing how at least a 10% gain in units will be delivered over a 30-year period.
- This gain is achieved by enhancing or creating the same types of habitats that will be lost. This can be on the development site, on a separate registered BNG site, or the purchase of statutory credits as a last resort.
- The policy is also intended to ensure a consistent approach to mitigating impacts on biodiversity within the planning system, provide greenspace and economic opportunities for those providing biodiversity units.
- Academic researchers raise concerns about most habitat creation being projected to occur on development sites. They suggest greater biodiversity gains would likely come from requiring the habitat creation to be in areas of strategic conservation importance throughout landscapes.
- Other concerns raised include ecological skills and capacity gaps, and the enforcement and monitoring of the delivery of biodiversity units.

Background

In the UK, the decline of biodiversity, the abundance and variety of life on Earth ([PN 644](#)),^{a,3,4,5} has been well documented.^{6,7,8} In 2023, the Office for Environmental Protection (OEP) stated that England was “largely off-track” from achieving the 2023 Environmental Improvement Plan (EIP) goal of “thriving plants and wildlife”.^{9,b}

The EIP breaks this goal into 8 delivery themes, one of which is “mobilising green finance and the private sector”.¹⁰ Within this theme, biodiversity net gain (BNG) is intended to ensure developments are measurably positive for biodiversity. Land use changes, such as development, are one of the major drivers of biodiversity loss ([PN 617](#)).^{11,12}

In February 2024, the UK Government introduced mandatory BNG under the 2021 Environment Act (Figure 1).¹³ Alongside this there is:

- a strengthened public bodies biodiversity duty^c
- new biodiversity reporting requirements for local authorities¹⁷
- the requirement to implement Local Nature Recovery Strategies (LNRS, [PN 652](#))^{d,22}

Mandatory BNG is in addition to existing biodiversity and wildlife planning requirements.²³ The National Planning Policy Framework (NPPF) has required local authorities in England to embed strategies for gains in biodiversity in local plans since

^a Biodiversity refers not only to the diversity of the biological components of a system (genes, species, populations and ecosystems), but also more broadly to the interactions between species, structures of biological networks, and the overall functioning of ecosystems ([PN 644](#), [617](#) and [678](#)). These multiple components possess compositional attributes (such as genetic diversity), structural attributes (such as how isolated habitats are) and functional attributes (such as the amounts of organic matter being produced by plants).^{2,3}

^b The OEP highlight that a comprehensive baseline for the state of the environment against which to measure gains has not been established. They contend that the government’s published data on the natural environment is not adequate for monitoring progress across all 10 goal areas of the 25 Year Environment Plan.⁹

^c An amendment to the original Natural Environment and Rural Communities Act 2006 (NERC Act) section 40 duty, provided for in the Environment Act 2021. It extends the biodiversity duty on public authorities to include the enhancement of biodiversity alongside conservation by way of creating “the general biodiversity objective”.¹⁴ The duty requires public authorities to: consider what can be done to conserve and enhance biodiversity; agree policies and specific objectives based on this consideration; and act to deliver these policies and achieve the objectives.¹⁵ The 2017 House of Lords Select Committee on the Natural Environment and Rural Communities Act 2006 recommended the government strengthen the wording of the duty.¹⁶

^d LNRS map valuable existing areas for nature and areas where creating or improving habitat is needed to achieve nature and wider environmental goals (focus areas). The Defra Secretary of State appointed 48 responsible bodies to lead on preparing an LNRS in 2023. The 48 areas covering the whole of England as required under The Environment Act 2021.¹⁸ The main objective of the LNRS is to identify what actions should be prioritised in different locations to create or improve habitat to provide the greatest benefit for nature and the delivery of nature recovery targets.¹⁹ BNG is intended to encourage habitat creation in these areas.²⁰ LNRSs are expected to be published by early 2025.²¹

2018 ([PB 34](#)), with principles and standards for developers set out by relevant organisations.^{24,25}

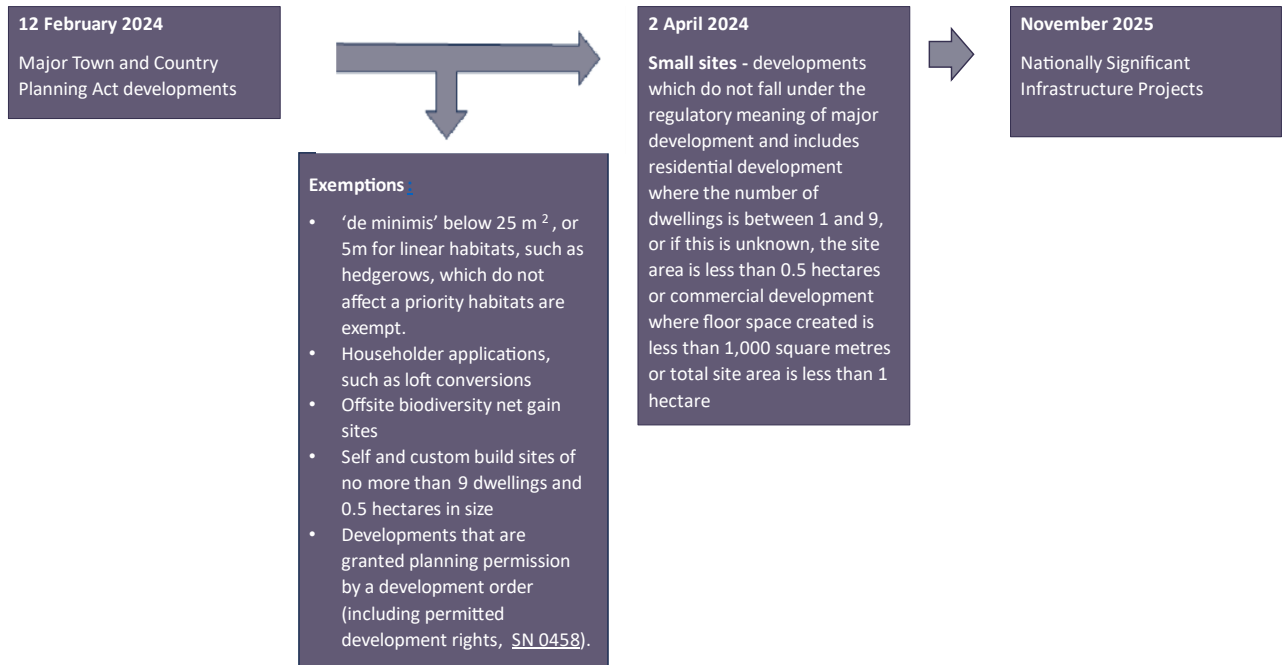
The objectives of the mandatory BNG policy include:

- contributing to habitat and species recovery goals^{26,27}
- creating places for people and nature that benefit local communities^{1,26,13}
- economic opportunities for landowners creating or enhancing habitats²⁶
- greater consistency to net gain approaches within the planning process for developers²⁷

The 2019 BNG policy impact assessment states that developers causing the most environmental damage should face the highest costs to steer development towards the least damaging areas and designs.²⁷ It estimated that 5,428 ha of habitat would be created, and 9,644 ha of habitat damage would be avoided per year based on a 10 year appraisal period (England's land area is around 13,046,000 ha²⁸).²⁷

The evidence suggests most created habitat will be on development sites (see challenges for securing future gains below).²⁹

Figure 1: Expected timeline of BNG implementation. BNG applied to major developments from February 2024 and then extended to other developments from April 2024 with some exemptions. It is expected to apply to Nationally Significant Infrastructure Projects from the autumn of 2025.^{e,f,34,35,36,37}



^e On 12 February 2024 BNG became mandatory for major Town and Country Planning Act developments. This Act extends down to Mean Low Water thus BNG applies to developments within the intertidal zone, with some differences set out in guidance.³⁰ Marine net gain may apply to developments below the Mean Low Water Mark in future, which is not discussed in this POSTnote.^{31,32} The autumn 2025 timeline for the application of BNG to nationally significant infrastructure projects has not been set out in legislation.

^f The BNG requirement applied to small site developments from 2nd April 2024. There is a small sites biodiversity metric tool (SSM) for developments that do not fall under the regulatory meaning of major development. This includes residential development where the number of dwellings is between 1 and 9, or if this is unknown, the site area is less than 0.5 hectares or commercial development where floor space created is less than 1,000 square metres or total site area is less than 1 hectare (ha).³³

The BNG process and metric

Mapping, measuring and calculating

Baseline survey

Government guidance recommends developers retain a professional ecologist to gather and assess the required data, which is one of the principles set out in the statutory metric guidance (Table 1).

A baseline survey maps the size, state and presence of differing patches of vegetation types on a development site using the UK Habitat Classification (UKHab).⁹ Hedgerow and watercourses are recorded separately as linear features measured in kilometres. The survey involves quantitative data and judgements about habitat classification, condition and landscape-scale ecological significance.^{h,41,24}

The baseline survey provides a minimum or starting point with which to compare before and after an intervention.⁴² A map showing the onsite habitat types existing on the date of application must be submitted alongside the metric calculation.⁴³

Applying the metrics

The statutory metric is set out in secondary legislation,⁴⁴ with four mandatory rules applying to its use (Table 2).⁴⁵

The BNG metric is calculated using a Defra supplied spreadsheet. The data from the baseline survey is input to the spreadsheet to determine the pre-development value of the biodiversity units on the site.^{35,46} This generates pre-intervention scores for each habitat patch, based on the size, distinctiveness, condition and significance (Figure 2).

The significance score reflects the value of a habitat type in that location and can apply an uplift of 15%. If a Local Nature Recovery Strategy (LNRS) has yet to be published by the local authority, ecologists undertaking the baseline surveys are temporarily permitted to assess significance. To enable this, the local planning

⁹ UKHab has been designed to build on existing ecological classifications of vegetation types. It is a fully translatable, hierarchical system that integrates with all major habitat classifications in use in the UK and Europe (PB 48). UKHab is owned by the not-for-profit company (UKHab Ltd) who ensure version control and oversee any changes that are required in codes and habitat definitions, and licence use of metric to users such as Defra and Natural England.³⁸

^h The metric has been developed through a decade of different iterations by Natural England. The data required from the project site include: quantitative data (the area of each habitat patch within the development site and in the proposed post development plan), qualitative judgments from ecological consultants regarding the existing habitats' condition and classification, and some other information such as whether habitats on the project site are a local priority for conservation (PN 652). These data gathered at the project site are integrated in the metric (Figure 2), which is preset for each habitat type and condition level based on expert judgment. For example, the likely timeframes for a planned habitat to be created to reach the target condition, but geospatial data is available that can aid baselining and published condition assessments to provide consistent criteria for assessments.^{39,40}

authority (LPA) must identify an appropriate document, such as the relevant river basin management plan (PN 709) or tree strategy.

Table 1: Biodiversity net gain metric principles⁴⁵

Principle 1	The metric assessment should be completed by a competent person (with the level of ecological qualification and experience set out in the relevant British Standard ²⁵).
Principle 2	The use of this biodiversity metric does not override existing biodiversity protections, statutory obligations, policy requirements, ecological mitigation hierarchy or any other requirements. This includes consenting or licensing processes, for example woodlands.
Principle 3	This biodiversity metric should be used in accordance with established good practice guidance and professional codes.
Principle 4	This biodiversity metric is not a complex or comprehensive ecological model and is not a substitute for expert ecological advice.
Principle 5	Biodiversity units are a proxy for biodiversity and should be treated as relative values.
Principle 6	This biodiversity metric is designed to inform decisions in conjunction with locally relevant evidence, expert input, or guidance.
Principle 7	Habitat interventions need to be realistic and deliverable within a relevant project timeframe.
Principle 8	Created and enhanced habitats should be, where practical and reasonable, local to any impact and deliver strategically important outcomes for nature conservation.
Principle 9	This biodiversity metric does not enforce a minimum habitat size ratio for compensation of losses. Proposals should aim to: <ul style="list-style-type: none"> • maintain habitat extent - supporting more, bigger, better and more joined up ecological networks • ensure that proposed or retained habitat parcels are of sufficient size for ecological function

Source: Defra, The Statutory Biodiversity Metric User Guide Date: February 2024⁴⁵

Hedgerows and water linear features have separate calculations within the spreadsheet (Table 4).⁴⁵ The total score determines the biodiversity units present on the site before development.⁴⁵

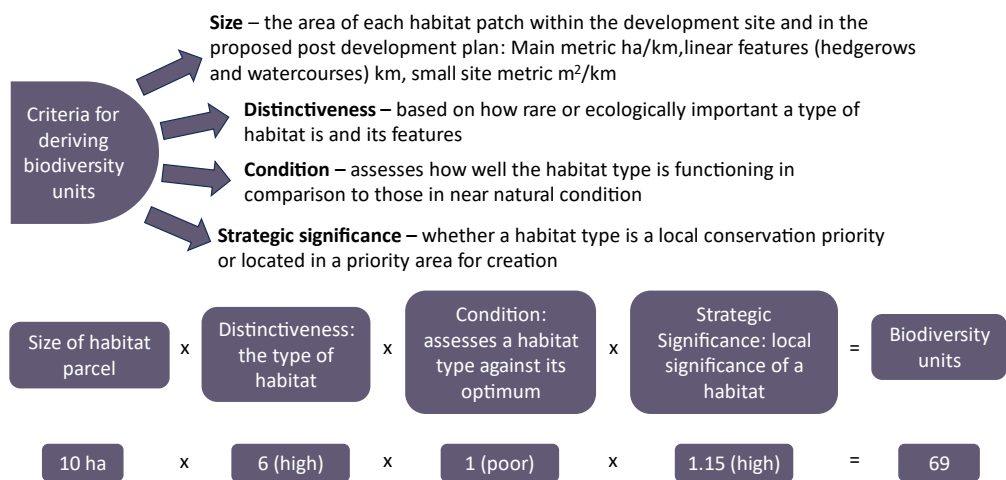
Small site metric

Since 2 April 2024 mandatory BNG has applied to small developments (Figure 1), which may opt to use the simplified small site metric (SSM) to determine the value of the existing habitats.

Table 2: Biodiversity metric rules	
Rule 1	The trading rules must be followed (see Table 4).
Rule 2	Biodiversity unit outputs, for each type of unit, must not be summed, traded, or converted between habitat types. The requirement to deliver at least a 10% net gain applies to each type.
Rule 3	The biodiversity metric calculation tool or small sites biodiversity metric tool must be used to calculate the change in value and demonstrate how the net gain requirement will be met.
Rule 4	Deviation from the methodology can be permitted by the relevant planning authority in exceptional ecological circumstances.

Source: Defra, The Statutory Biodiversity Metric User Guide Date: February 2024⁴⁵

Figure 2 The baseline survey pre-intervention score calculation



Source: Panks, S, *et al.* 2022. Biodiversity metric 3.1: auditing and accounting for biodiversity- user guide. Natural England⁴⁷

It can only be used if the habitats on the site are the limited ones within the metric, and if no priority habitats,ⁱ no protected habitats^j or European protected species^k are present on the site.⁴⁵

The SSM can be applied by a 'competent person' with the knowledge and skills to perform specified tasks to complete and review SSM calculations rather than an ecologist. It cannot be used to calculate the gains needed, which is done by the biodiversity unit provider (see gains off development sites below).³³

Calculating gains

Biodiversity gain plans^l must be submitted to local planning officers after planning permission is granted. Using the metric, they demonstrate how the developer will deliver a minimum 10% gain in on and/or offsite biodiversity 'units' from what is initially present at the development site within 30 years (Figure 3).⁵¹

When calculating gains, multipliers are applied to scores for the planned habitat creation or enhancement to reflect delivery risks or benefits.⁴⁵ The risk multipliers reflect:

- the distance the biodiversity unit is delivered from the development. If insufficient offsite units are available to purchase within the LPA, then compensation is permitted elsewhere. The multiplier is higher if provision is in an adjoining LPA or national character area,^m and higher still if in another part of England, increasing the number of units required.ⁿ
- that planned gains may not be delivered, such as the habitat creation/enhancement technique failing.

ⁱ These habitats first identified as priority habitats in the UK Biodiversity Action Plan (UK BAP), first published in 1994 as a response to the 1992 Convention on Biological Diversity.⁴⁸ In 2008, a revised list of 65 priority habitats was produced, following a 2-year review of UK BAP processes and priorities.³⁴

^j The main conservation designations for protecting habitats on land in England are: Sites of Special Scientific Interest; Special Protected Areas; Special Areas of Conservation; Ramsar sites; National Nature Reserves; Local Nature Reserves; Areas of Outstanding Natural Beauty (AONB) and National Parks (see [PN 679](#)).

^k European protected species have full protection under The Conservation of Habitats and Species Regulations 2017. This makes it an offence to capture, injure or kill, or disturb these species without the relevant licence, with bats, newts and dormice being some well-known examples.⁴⁹

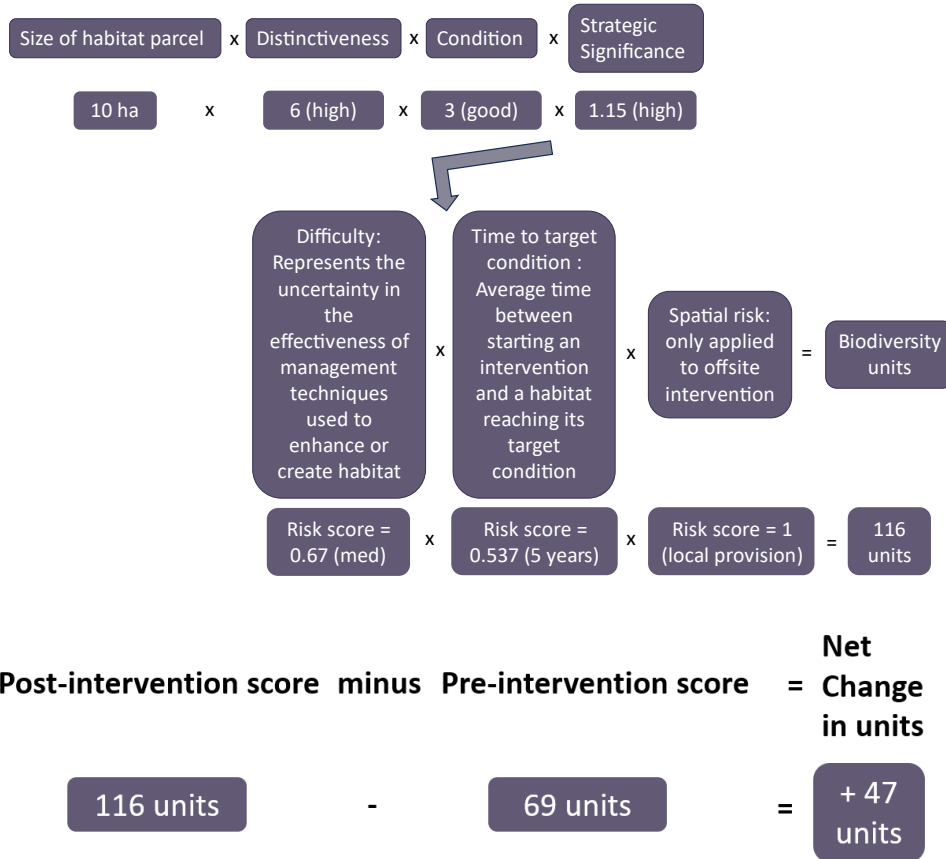
^l Templates are provided for plans. Plans must include the completed biodiversity metric tool calculation, pre-development and post-development plans showing on-site habitat locations and a compensation plan if the development affects irreplaceable habitats. If developers are buying off-site units, a biodiversity net gain register reference numbers or proof of purchase for statutory biodiversity credits are required and habitat management and monitoring plans for off-site or significant on-site gains.⁵⁰

^m National Character Areas divide England into 159 distinct areas based on landscape, biodiversity, geodiversity, history and cultural and economic activity.⁵²

ⁿ This reflects who benefits from the biodiversity rather than the ecological requirements of habitat creation. It may create anomalies whereby areas that are close by a development but fall across an LPA boundary would require more units than an area further away but still in the same LPA.⁵³

- that the created/enhanced habitat may not reach the required condition within the 30-year timeframe.^o

Figure 3: Newly created habitat post-intervention calculation



Source: Panks, S, *et al.* 2022. Biodiversity metric 3.1: auditing and accounting for biodiversity- user guide. Natural England⁴⁷

In terms of benefits, if the habitat types are created or enhanced in a location of strategic significance, the 15% uplift is applied. For example, an LNRS may identify priority actions for habitat enhancement or creation in the location of a proposed development. If a development proposes undertaking the mapped action and the development does not contradict the mapped action, the multiplier could be applied.^p

^o The Metric accounts for each year of delay by applying the HM Treasury social discount rate of 3.5% per year. It does not take account of the value of biodiversity changing over time, such as the increasing value of scarce species.⁵³

^p Guidance states that the metric uplift should only be applied if the habitat intervention is consistent with what is proposed in the LNRS. For example, a developer could not replant an orchard onsite and claim strategic significance for enhancing the orchard that was there previously. Defra is considering

Government advice states developers can combine all onsite units, offsite units and statutory credit options to achieve BNG (see sections below), but should follow the BNG hierarchy steps in order (Table 3).^{43,55} Local planning authorities (LPAs) must consider the application of the BNG hierarchy in biodiversity gain plans.^{56,43}

Table 3: BNG Mitigation Hierarchy	
Avoidance	The avoidance of adverse effects from the development on medium, high and very high distinctiveness (a score of 4 or more according to the statutory biodiversity metric, see table 4). While avoidance is required by the hierarchy, retention of existing habitat alone does not count as an on-site enhancement and contribute to the gain (or loss) metric calculations. ⁵⁵
Mitigation	Where adverse effects cannot be avoided on these habitats, mitigating those effects.
Compensation	In relation to all onsite habitats adversely affected by the development adverse effects should be compensated for by prioritising in order: <ul style="list-style-type: none"> • enhancement of onsite habitats • creating onsite habitat • purchasing registered offsite biodiversity units • purchasing statutory national biodiversity credits

Source: Ministry of Housing, Communities and Local Government Guidance Biodiversity Net Gain⁴³

Trading Rules

The trading rules are based of the distinctiveness of habitats (Figure 1). To ensure that any habitat lost to development is replaced for like-for-like or like-for-better; trading down is not permitted (Table 4). For example, on low distinctiveness recreational grassland, relatively low-cost actions to enhance the habitat onsite to become moderate value wildflower meadow habitats would generate a gain.

Irreplaceable habitat exemptions

The LNRS will map irreplaceable habitats as “areas already of particular importance for biodiversity”.⁵⁷ However, BNG secondary legislation defines irreplaceable habitat as those types listed in a schedule: ancient woodland; ancient and veteran trees; blanket bog; limestone pavements; coastal sand dunes; spartina saltmarsh swards;

further guidance and materials to ensure it is well understood what interventions are 'consistent'. The Wildlife Trusts have raised concerns that current guidance states that if a development project delivers the mapped potential measure set out in an LNRS, the pre-intervention strategic significance score of the habitat type should be scored as low. They suggest this places more emphasis on creating habitat rather than retaining the habitat that exists, steering development towards inappropriate locations.⁵⁴

Table 4: Trading rules for compensating for losses			
Baseline habitat distinctiveness	Area units	Hedgerow units	Watercourse units
Very high distinctive habitat (Score=8)	Losses are not permitted under the metric and must be replaced with the same number of units and habitat type. These are rare habitat types that are a conservation priority, and LPAs can require bespoke compensation.	Losses must be replaced with hedgerow units of the same habitat type.	Priority should be given to replacing losses with watercourse units of the same habitat type. This must be a section of watercourse with similar habitat features. For instance, impacts on canals cannot be offset by habitat restoration of rivers.
High distinctive habitat (Score=6)	The same habitat type must be created or enhanced to replace the biodiversity units lost.	Losses must be replaced with hedgerow units of the same habitat type or of a higher band	Losses must be replaced with watercourse units of the same habitat type.
Medium distinctive habitat (Score=4)	For medium distinctiveness habitat, an area of habitat of the same broad habitat type or any broad habitat type from a higher distinctiveness band can be created or enhanced to provide gains. The trading rules allow for a smaller area of any type of higher distinctiveness habitat to be created or enhanced.	Losses must be replaced with hedgerow units of the same habitat type or of a higher band.	Losses must be replaced with watercourse units of the same habitat type.
Low distinctive habitat band (Score=2)	For lower distinctiveness habitats, an area of any type of habitat in this distinctiveness band or any type of higher distinctiveness habitat is required to be created or enhanced to provide gains.	Losses must be replaced with hedgerow units of the same habitat type or of a higher band	Losses must be replaced with watercourse units of a higher band.
Very low distinctive habitat (Score=0)	Replacement of habitat not required; for instance, large urban areas covered in hardstanding, would score 'very low' for distinctiveness.	Losses must be replaced with hedgerow units of the same or of a higher band	Not required.

Source: Source: Defra, The Statutory Biodiversity Metric User Guide Date: February 2024⁴⁵

Mediterranean saltmarsh scrub, and lowland fens.¹³ Their loss is excluded from BNG considerations, which do not change their existing habitat protections.⁹

They must be recorded in the spreadsheet but are exempted from BNG as compensation is not possible in relevant timescales. For example, studies suggest restored lowland fen areas still differ from near natural counterparts after 30 years.⁵⁹ However, if irreplaceable habitats are retained on the development site and enhanced, biodiversity units can be generated (see below).⁶⁰

Locally specific BNG policies

LPAs can adopt locally specific BNG policies in their Local Plan that developers must take account of when delivering BNG. For example, locally important habitat types or other strategic objectives including green infrastructure ([PB 26](#)), sustainable urban drainage ([PN 529](#)) and flood alleviation ([PN 623](#)).⁶¹

Some habitat creation measures required for statutory obligations, such as sustainable urban drainage ([PN 529](#)), can be included in BNG calculations.⁶² One project is looking to integrate the delivery of BNG with a district licensing scheme for great crested newts.^r The flexibility rule for the metric (Table 2) would allow changes by LPAs to address complex challenges, such as river re-meandering ([PN 709](#)).⁴⁵

Setting out these requirements helps LPAs triage applications accordingly and identify those likely to raise risks in advance of legal agreements being signed.⁶⁵ Local policies can include setting the BNG requirements higher than 10% net gain where sufficient evidence of need can be shown.⁶⁶

Out of 317 local authorities in England, 26 have committed to or are considering net gain requirements of greater than 10%.^{s,67} Local authority and industry commentators suggest this may be challenging for developers working across different local authority areas.^{69,68,65}

^q Planning policy already required that impacts on these habitat types is avoided, and consideration of losses and deterioration must be in relation to the up-to-date policies outside of BNG.⁵⁸ 56 habitats are also listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act (priority habitats). These habitats are a consideration under the NPPF and the biodiversity duty for public bodies. The NPPF requires that planning permission for development resulting in the loss or deterioration of irreplaceable habitat is only be granted in exceptional circumstances and if a suitable bespoke compensation strategy exists. Bespoke compensation plans can also be agreed for habitats categorised as very high distinctiveness in the BNG metric, exempting them from BNG (Table 4).

^r Natural England's district level licensing scheme for great crested newts is now available to 155 local authorities, where developers can pay into collective funding of off-site compensation ponds instead of carrying out detailed newt surveys and applying for a mitigation licence.⁶³ The NatureSpace Partnership is considering how to assign biodiversity units generated by District Licensing compensation to individual development sites, as required under BNG, as well as how to align the legal and other requirements of the two schemes including the BNG trading rules.⁶⁴

^s This includes suggested commitments in local plans being consulted on. The Home Builders Federation suggest 10% BNG requirement should be fully functioning before it can be raised, and that LPAs should be prevented from producing supplementary planning documents on BNG and be required to refer to the national guidance.^{67,68}

Challenges for securing future gains

In the 2018 NPPF BNG consultation, Defra acknowledged the difficulty of reflecting complexity of biodiversity in a simple metric based on a combination of the area and condition of habitat lost or gained.^t

However, they stated the simplicity provides consistency for governance of biodiversity offsetting systems (PB 34).^{u,71} Studies of countries with biodiversity offsetting systems suggest such metrics are broadly applicable across different habitats at different scales and easier to apply transparently. Complex metrics may reduce trading and economic efficiency.^{72,73,74}

However, researchers suggest biodiversity outcomes of these systems are uncertain.^{75,76,77,78,79,80,29,81,74,82,83} For habitat created as BNG biodiversity units, a five year monitoring study suggested there are increases in plant diversity, but showed no consistent relationship with the presence of mobile animal species of conservation concern.⁸⁴ Another study states that the BNG approach overlooks invertebrate conservation considerations, which have pivotal ecological roles.^{v,85}

Ecological restoration is a process rather than an endpoint, and the time taken for distinct aspects of habitats to be restored varies from years to centuries. It differs between habitat types, degrees of degradation and restoration approaches (PB 48).

Restoration methods are well established for some types of semi-natural grassland.^{86,87,88} Methods for harder to restore habitat types over longer periods have less certain outcomes.⁶⁵ For example, it can take between 80 and 160 years for restored woodlands to begin to attain the species and characteristics of mature woodlands in good condition.^{89,90}

Defra argue it will take time for new habitats to be colonised by species or for habitat conditions to become suitable and that the multipliers applied in the calculation of the BNG metric seek to address these risks.^{91,39} However, researchers raise concerns that using funding from developers based on the certain loss of biodiversity to fund conservation activities on a diminishing amount of land for nature creates uncertainties for delivering future biodiversity gains (PB 34).^{92,93,94,95,96}

In the US wetland habitat banking system,^w the uncertainty of gains is addressed by only permitting the sale of units once certain restoration success criteria are

^t Academic commentators describe the statutory BNG metric for England as a 'multiplicative composite indicator' (PB 41), which is used to calculate 'standardised biodiversity units'.²⁹

^u Biodiversity offsets are usually described as measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken, such as habitat creation (PB 34).⁷⁰

^v Insects, spiders, snails, worms and other terrestrial animals without a bony skeleton or backbone are collectively referred to as invertebrates. They are a food source for vertebrate species, such as birds, and perform key functions, such as decomposition of plant and animal matter and pollination.

^w Habitat banking is a mechanism to provide offsets through the purchase of units/credits. The banked offset habitat area can be situated on private or public lands and operated by a government agency, corporation, non-profit organization, or other entity or ownership form.^{97,98} In the US, regulatory agencies approve banks and assign the ecological value of the held habitat through environmental

achieved, which is renewed on a five-year rolling monitoring and evaluation cycle,¹⁰¹ with common monitoring approaches including indices of biological integrity.^x

Empirical evidence of the outcomes of NPPF BNG requirements is available from a subset of LPAs that adopted policies prior to it becoming mandatory. It suggests large developments and energy infrastructure are most likely to opt to deliver biodiversity units onsite, with smaller developments more likely to purchase offsite.^{41,103} Most planned units were habitat creation rather than enhancement.⁴¹

The BNG register and conservation covenants

BNG is intended to provide a commercial incentive for landowners to generate biodiversity units.¹⁰⁴ A baseline survey and the metric is used to calculate the existing biodiversity units on the land, and to determine how many units planned habitat enhancement or creation activities will generate. The site must be recorded on the national public register with the allocated units sold to a development placed on the register along with the location.^{105,106}

The land used to deliver the units must be covered by a legal agreement. This can be via Section 106 agreements between the LPA and the offsite provider for the 30 years over which gains must be delivered.^y Alternatively, providers can enter into a conservation covenant with a responsible body, which maybe a local authority, a charity such as a wildlife trust or private sector conservation organisations.¹⁰⁸

Thirty-year period

Conservation covenants describe what the landowner and responsible body will do to conserve the land for the minimum of 30-years. This includes positive obligations, such as the creation of habitats, and restrictive obligations, to avoid activities that might harm the habitats. Once a covenant is registered, it is legally binding for future landowners and any subsequent responsible bodies.¹⁰⁹

The 30-year period is considered pragmatic for offsite providers,⁹¹ but some habitat types have restrictions attached to them once created.^z Some providers with nature

assessments to translate into a credit amount for transactions.^{97,98} The terms conservation banking, mitigation banking, bio-banking, or eco-account may be used synonymously with habitat banking.^{99,100}

^x The index of biotic integrity (IBI) was originally created to assess the condition of riverine fish and has been adapted to assess different aquatic habitats. The term "integrity" refers to pristine conditions unaltered by human pressures. IBIs assess multiple indicators of ecological conditions relative to an unimpacted condition and often relate to taxonomic richness, functional groups, and species community composition. A score is applied to each metric, with the sum of scores across all the chosen metrics yielding the IBI score; high scores indicate more similarity with pristine reference conditions.¹⁰²

^y Section 106 agreements are legal agreements between a planning authority and a developer, or undertakings offered unilaterally by a developer, which ensure that certain extra works related to a development are undertaken.¹⁰⁷

^z The Forestry Commission generally issues felling licenses with a requirement to restock, which means that woodlands, once created, are permanent.¹¹⁰

as their remit will protect gains in perpetuity.^{aa} Habitats must reach the required distinctiveness (Table 2) and condition in covenants within the 30 years. The legislation allows ongoing increases in biodiversity value to be sold on for a further 30 years, which may arise in habitat types that take longer to restore.^{65,91}

Gains on development sites

The BNG impact assessment suggests between 50 and 75% of BNG will be delivered onsite.²⁷ However, Defra has yet to set out a comprehensive information source to evaluate delivery of onsite gains.^{bb,113} The NAO and academic researchers have raised concerns that onsite gains are in a 'governance gap' as they will not be placed on the BNG national public register.^{41,113,74,114}

Pressures such as recreational use creates challenges for reaching habitat distinctiveness and condition targets.^{54,115,116} Researchers also suggest loss of larger areas of low quality habitat for the creation of smaller areas of higher distinctiveness habitat onsite may result in less open green space overall in developments.^{117,115}

On-site biodiversity units created that the LPA considers a 'significant' gain should be secured for the 30-year period through a planning condition, a Section 106 agreement or a conservation covenant. This requires resourcing of monitoring and enforcement (see below).^{65,cc}

The Planning Advisory Service recommend LPAs consider that significance relates to how many units above the baseline are planned to be delivered onsite. Significance may also depend on ecological advice on the local importance of the habitat for wildlife.¹¹⁸

Most onsite habitat enhancements that count towards the metric, such as private gardens, do not need to be covered by legal agreements. Other proposed transient features, such as green roofs and walls, may be significant and need to be covered by legal agreements.^{119,39} LPAs may also require legal agreements for wider planning policy reasons.

While legal agreements may be with developers, they can choose to contract to estate management companies.^{dd} The Competition and Markets Authority has raised

^{aa} The RSPB are offering units for a variety of habitats across their reserves,¹¹¹ as are the Wildlife Trusts.¹¹²

^{bb} Information about expected on-site gains is part of individual planning applications, accessible only via local authority planning portals and would be challenging to access and aggregate.

^{cc} What counts as a significant enhancement varies according to the scale of development and existing habitat set out in the pre-development baseline survey, and include: habitats of medium or higher distinctiveness in the biodiversity metric; habitats of low distinctiveness that create a large number of biodiversity units relative to the biodiversity value of the site before development; habitat creation or enhancement where distinctiveness is increased; areas of habitat creation or enhancement that are significant in area relative to the size of the development; and enhancements to habitat condition, such as from poor to good.⁵⁵

^{dd} The Competition Markets Authority found an increasing trend by developers to build estates with privately managed public amenities, with 80% of new homes sold by the eleven biggest builders in 2021 to 2022 subject to estate management charges.¹²⁰

concerns about the high charges estate management companies place on homeowners, including for greenspace management.¹²⁰

There is additional planning guidance for large scale phased development over long periods to clarify when the 30-year period for onsite BNG units is initiated.^{ee}

Irreplaceable habitats

Enhancement of irreplaceable habitats retained onsite can generate biodiversity units. Research indicates if developments make such habitats more isolated there is a risk of future deterioration. Studies suggest the ability of species to move between habitats is reduced, which may cause biodiversity losses.^{ff,125,126}

Defra will consult on the irreplaceable habitat definition in 2024. The Wildlife Trusts argue for a clearer irreplaceability definition and criteria, as well as the means of classifying habitats as irreplaceable locally.⁵⁴ Rare habitat types that would take extended timeframes to recreate, such as ancient hedgerows and grasslands, are not yet listed.^{127,128,129,130,131} Previous academic literature has described irreplaceable habitat as 'critical natural capital'⁹⁹ that should not be traded off for development.¹³⁵

Gains off development sites

Landowners can either sell units directly to developers, as part of a group selling to developers or through a habitat bank operator. Defra suggest one-to-one trading between a developer and a landowner or habitat bank operator allows habitat to be tailored to the development.³⁹

Habitat banks have been set up by local authorities, wildlife trusts, developers and other private operators. For example, a company has bought Harold's Park, a 200-hectare arable farm near London to create biodiversity units through rewilding restoration approaches ([PN 537](#)) to sell to housing developers in Essex.¹³⁶

Arable land is classified as a low distinctiveness habitat (Table 2). Researchers suggests this risks the loss of natural capital for food production and may effect species reliant on farmland habitats.^{137,138} Defra argue the 10% BNG requirement will lead to an increase in natural capital overall, and unproductive arable land can be the focus of habitat creation.³⁹

^{ee} Phased development can occur over a long period of time where full details of all phases may not be known at the time of outline planning permission, such as a large-scale urban extension. An initial overall biodiversity net gain plan must be submitted for approval, as well as a phased biodiversity gain plan to be approved at the beginning of each phase that demonstrates its contribution to BNG and progress towards the overall objectives.^{43,69,68}

^{ff} Habitat fragmentation is the process of habitat loss leading to habitats being broken into smaller, more isolated remnants, but the effects are scale and species dependent as well as context specific.¹²¹ More isolated habitats may become 'sink habitats' with declining wildlife (as reproduction is less than mortality) with population boom and bust events in response to environmental changes.^{122,123,124}

⁹⁹ The Natural Capital Committee defined natural capital as: the part of nature which directly or indirectly underpins value to people, including ecosystems, species, freshwater, soils, minerals, the air and oceans, as well as natural processes and functions.¹³² Critical natural capital can be described as the parts of the natural environment that perform important and irreplaceable functions.^{133,134}

At present, there is no offsite providers quality assurance nor a central information source of available habitat units.^{hh,69} For Small Site Metric users seeking fractions of a unit, habitat banks are likely to be the only option, but Defra suggest developers could alternatively buy land to provide biodiversity units for their sites.^{39,ii}

There may be limited unit availability within some local authority areas,^{65,69,116} and the Home Builders Federation raise concerns this may increase planning application time windows.^{68,ji} However, if units for a type of habitat cannot be purchased, then developers can buy statutory credits for that habitat from the government.¹⁴¹

A strategic landscape approach to gains

The strategic conservation role of LNRS is wider than BNG, but the main purpose of LNRS is to “identify locations to create or improve habitat most likely to provide the greatest benefit for nature and the wider environment”.¹⁴²

However, researchers raise concerns that the LNRS process is not sufficiently standardised across local authorities and uses different data classifications from the BNG approach.¹²⁶ They suggest more holistic approaches are needed to restoring habitats strategically across landscapes if biodiversity gains and other environmental benefits are to be effectively delivered by BNG (Table 5).^{kk,143,41,29,75,144,93}

Statutory credits

Developers who state they cannot secure the required biodiversity units on or offsite can buy statutory credits from the government, with prices set at high levels to avoid competing with the provision of off-site biodiversity units.^{141,145} Submitted biodiversity gain plans must set out evidence of a lack of market supply in England (with a minimum of 3 local or national suppliers, habitat banks or traders approached).¹⁴¹

There will be no public register of the sale of statutory credits, but the Environment Act requires reporting on credit spend, which must be invested in habitat creation or enhancement.^{141,ll} The Wildlife Trusts raise concerns about the lack of a public register of statutory credit purchasers.⁵⁴ Academic commentators state a similar approach to the purchase of credits in an Australian scheme resulted in the development of areas with difficult to create or restore habitats.^{146,126}

^{hh} The Future Homes hub has set up an online map and asked parties with available BNG units to notify them with 200 sites containing more than 20,000 units on a voluntary basis.¹³⁹

ⁱⁱ Industry commentators also raise concerns that use of the small site metric by non-experts will increase the risk of applications being rejected.^{140,68}

^{ji} The Home Builders Federation suggest local plans should set out whether sites delivering offsite BNG are acceptable in principle in green belt areas.

^{kk} The approaches set out in Table 5 could be combined; for instance, a metric based on systematic conservation approaches could be combined with a multilateral trading approach overseen by a market operator that requires developers to pay the compensation units and determines the number of units a landowner receives.¹²⁶

^{ll} The Home Builders Federation are calling for assurances that the statutory credits system can deliver BNG benefits to increase confidence they will deliver the required units for developers.⁶⁸

Table 5: Suggested strategic approaches to delivering net gains

Metric based on systematic conservation approaches	By understanding the impact their loss would have, metrics based on systematic conservation planning studies ^{mm} can determine how important any location is to achieving national, regional and local nature recovery targets. ^{77,75} Sites that can easily be substituted have a lower score, whereas the highest scores are for sites required to achieve conservation goals. This metric approach minimises costs to the private sector by identifying low scoring substitutable sites. It also fairly rewards landowners for the contribution high scoring land makes to nature recovery, including further investment in restoration. ^{77,75,144} As trading outcomes are strategic, the metric allows continual progress for a range of other environmental targets to be integrated into this single approach.
Facilitating multilateral trading	Other researchers suggest one-to-one trading of biodiversity units between developers and providers is less efficient than having an administrative body acting as a market operator facilitating simultaneous multilateral trading. ¹⁵⁰ This reduces the risk for landowners investing in habitat creation, and the cost of delivering the required units. ⁵³ For example, the Trust for Oxfordshire's Environment has a memorandum of understanding with local authorities in Oxfordshire to act as a broker for those purchasing units. The Trust grants funds to nature restoration projects, ^{151,152,153} such as Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust's 'habitat bank' ⁿⁿ at Duxford, to deliver landscape scale objectives. ¹⁵⁶ The researchers also suggest that any metric used should be based on reducing risks of extinction of species. ⁷²
Creating an ecological permission system	To appropriately reflect the reality of how habitats support species, some academic commentators argue an 'ecological permission' system is required alongside the existing planning system and any BNG metric. ^{125,93} This would be a mechanism for representing biodiversity independently in decision making by providing strategic oversight of what habitats are created and that the local importance of habitats are considered. This would include case-by-case consideration of the social and ecological appropriateness of biodiversity offsetting, representing the needs of local species' populations and assessing effects on ecological functioning. ^{oo,93} These considerations would include: What species are here? What do I know about what they need? What do we want to encourage here? What does that mean in the wider landscape context? ¹²⁵

^{mm} Systematic conservation planning is a rigorous, repeatable, and structured approach to designing protected areas that efficiently meet conservation objectives that can incorporate a wide variety of data types. This includes attributes of ecosystems at all levels of structural, taxonomic, and functional organisation, and accounting for social, financial, and political constraints and opportunities.^{75,147,148,149}

ⁿⁿ A biodiversity compensation mechanism based on the mechanism of biodiversity offsets.¹⁵⁴ The bank is habitats created or restored in anticipation of being purchased as biodiversity units to replace destroyed habitat.¹⁵⁵ Under the BNG system in England, the habitat must be protected, managed and monitored for 30 years.¹⁰⁴

^{oo} Ecological functioning is how species interact in and with a habitat to give rise to the processes that maintain communities of species and ecosystems, such as decomposition or pollination. It is synonymous with ecosystem properties or ecosystem structure and function.^{157,42}

Local authority access to expertise

The NAO and academic commentators suggest local authorities do not have sufficient resources to regulate the system being created due to lack of in-house ecological expertise and enforcement capacity (Table 4).^{29,113,158,159,160} Studies also suggest problems with implementation, lack of compliance and enforcement, led to the failure of previous planning biodiversity compensation policies (PN 429).

Biodiversity gain plans need to be assessed by the approving LPA. However, the metric does not provide an assessment of the viability of the proposed habitat creation and enhancement, and ecological expertise will be needed to determine feasibility.^{pp}

For example, the complexity of sites may be challenging for ecologists to map and assess, such as 'open mosaic habitats' that spontaneously regenerate on brownfield sites with often-high levels of biodiversity. Creating the necessary types of compensatory habitat may also be challenging and assessing their viability requires relevant expertise.^{qq,164,29}

Principle 4 (Table 1) sets out that the metric is not a substitute for ecological advice and is in addition to all existing species requirements. However, researchers raise concerns around consideration of species locally that rely on habitats that are not classified by the metric as nationally distinctive or conservation priorities.¹⁶⁵

Changes made to the habitat types in the UKHab classification means that some are not in the metric. Updating the metric will require a public consultation before changing the legislation. LPAs will rely on professional judgement in the interim to assess scoring of these habitats.¹¹⁶

Challenges for monitoring biodiversity outcomes

Researchers and the NAO have highlighted governance risks around the monitoring of projected gains.^{41,29,113} Monitoring reports must be submitted in line with a set time schedule in legal agreements and ensuring this occurs is the responsibility of the LPA or responsible body.

Offsite landowners or onsite land managers must supply these in line with the requirements set out in approved habitat management and monitoring plans.¹⁶⁶ Frequency will depend on the habitat and complexity of the management plan, but

^{pp} Researchers have produced a guide on whether submitted Biodiversity Gain Plans are correctly completed, are feasible, and take into account their local ecological and social context.¹⁶¹

^{qq} Open mosaic habitats can be extremely diverse, including such wide-ranging sites as railway sidings, quarries, former industrial works, slag heaps and brick pits. Brownfields with open mosaic habitats show evidence of previous disturbance, either through soil being removed or severely modified by previous use, or the addition of materials such as industrial spoil, with spatial variation developing across the site.¹⁶² The resulting variation allows for a mosaic of different habitats to be supported in close proximity creating a patchwork of varied habitats such as bare ground, wild-flower rich grassland, heathland and other habitats. A high-quality brownfield site can support high numbers of rare species.¹⁶³

most likely annually undertaken for the first five years. Monitoring frequency may reduce over time once the habitat has become more established.⁵⁴

Academic commentators suggest strategic monitoring of BNG sites across landscapes as reference points before and after developments would provide evidence of overall net gains.^{126,53} Monitoring the outcomes of ecological restoration is complex, and could be informed by existing standards, such as wildlife survey metadata. However, for BNG it is solely confined to metric scores.^{137,125,167}

The lack of regulatory monitoring capacity has been an issue for biodiversity offsetting in different countries.^{75,29,168,169} To address this, offsetting systems frequently include fees within biodiversity unit costs to cover monitoring and enforcement.^{41,143} BNG monitoring inspections can be charged for under S106 agreements, but the limited numbers currently applying for responsible body status has raised concerns about the overall resource implications for LPAs.^{170,41,143,65}

An iterative approach

The 2024 NAO report found widespread support for the mandatory BNG policy, but some organisations raised implementation challenges (Table 6).¹⁷¹ Defra state the BNG secondary legislation will be evaluated in a post implementation review in 5 years (February 2029), with 3 to 5 year updates of the metric.³⁹

Table 6 Key challenges for biodiversity net gain implementation

<p>Regulating and auditing the delivery of biodiversity units</p>	<p>The NAO set out risks that local authorities will not be able to discharge legal, compliance and enforcement obligations in relation to BNG,¹⁷² and if Defra will be able to effectively monitor their performance.¹¹³ Offsite BNG providers can sell credits for other benefits from the same piece of land, such as nutrient mitigation,^{rr} to 'stack' multiple credits.^{ss,176,177,173} UK nature markets standards are being developed,¹⁷⁸ but researchers suggest suitable governance frameworks need to be in place that at minimum regulate fraud and deception.¹⁷⁹ Governments can take on the role of regulator to avoid or address market failures.^{180,181} Academic commentators suggest separating regulator and BNG market operator roles, with Defra auditing these operators to avoid the issues that have occurred in the carbon offsetting market (PN 713).⁵³</p>
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^{rr} Where created habitats, such as wetlands, reduce or capture nutrients from agricultural land and stop them entering watercourses, nutrient credits can be generated (PN 710).

^{ss} Stacking is when multiple credits or units from different environmental markets (such as BNG, nutrients and flood alleviation¹⁷³) are sold separately from an activity on a piece of land. However, the Woodland Carbon Code for voluntary carbon offsetting in the UK has prohibited the stacking of credits from other markets until a mechanism has been developed that will ensure the integrity of the carbon credits are not compromised (PN 713).¹⁷⁴ Academic commentators have also highlighted stacking may not lead to optimal outcomes if markets and targets have not been appropriately designed for this.¹⁷⁵ For example, habitats which facilitate multiple benefit stacking may not be those local biodiversity requires.¹³⁸

Managing trade-offs with other environmental objectives	Researchers suggest a more robust overall environmental assessment is required. ^{182,119} The voluntary Environmental Benefits from Nature Tool estimates changes in 18 ecosystem service benefits and is intended to work alongside the BNG metric. ¹⁸³ However, the supply of some ecosystem services often relates to the quantity rather than just the quality of a habitat, with smaller areas providing a lower level of benefits such as reducing surface water flows. ¹⁸⁴ Researchers suggest other possible approaches, such as the Wallacea Trust biodiversity credit basket of 5 additional metrics alongside the BNG metric. ^{185,137}
Delivering optimal outcomes for nature	Academic commentators state that a dominance of habitat creation on development sites is unlikely to deliver optimal outcomes for nature. ^{143,41,29,75,144,93,54} Industry commentators also suggest a lower housing density to accommodate on-site gains may lead to more land being required for development overall. ⁶⁸ Academic commentators also suggest loss of low and medium distinctiveness habitats that are essential resources in a local context, such as woodland, may have impacts on species, regardless of metric scores. ⁹³ The metric also does not consider factors such as species abilities to move between habitats. ^{tt} The metric could be amended to reflect species needs, ⁵⁴ such as invertebrate structure condition assessment scores, ¹⁸⁶ but this would increase the metric's complexity. Some species could be prioritised for onsite gains as they can co-exist with humans, such as some farmland birds. ^{187,188}
Balancing the needs of existing communities and those being created	Defra state the need to avoid reducing communities access to nature. ^{171,39} Researchers argue not delivering gains locally may raise social justice issues and the importance of relationships and values with the local natural environment for a community's health and wellbeing. ^{189,161,190} However, there is no legislative power to protect areas of cultural significance when complex cultural value issues arise. ¹¹⁷ Local authorities may ask developers to secure offsite biodiversity units near to affected communities, but there is no legal requirement to do so. Some developers engage with communities on biodiversity. ^{191,192} Engagement may increase awareness of optimal types of habitats for biodiversity and foster local stewardship. ^{193,115,119} Most new developments will be in or near urban areas, approaches such as the urban greening factor introduced in some cities, may help create places for people and nature. ^{uu,197}
Alignment with the development process	Researchers argue for better alignment of BNG with the development process, including due diligence at the site selection stage. ¹¹⁵ The Home Builders Federation suggest sites with high biodiversity will be brought forward for development as BNG requirements are just "one of the costs" for securing

^{tt} Species have widely differing dispersal abilities, such as birds compared to reptiles. Understanding whether improving an area of land would lead to healthier overall populations of a species at the landscape level is not well supported by ecological data and requires qualitative judgements.^{126,125}

^{uu} For example, the Urban Greening Factor (UGF) was introduced by the Mayor of London in 2021 that requires developments to provide a set level of green infrastructure.¹⁹⁴ The UGF is calculated by assigning a score to all the surface cover types in a proposed development based on their ability to provide a variety of benefits, such as sustainable urban drainage features.¹⁹⁵ Guidance has also been provided on integrating UGF and BNG design requirements.¹⁹⁶

planning permission.^{68,140} Defra encourage developers to engage with LPAs throughout the process. Detailed landscaping is usually produced in the design and planning application stage, but biodiversity gain plans are a post development consent condition.⁶⁶

Access to ecological expertise

In 2021, 26% of LPAs did not have access to even external ecological expertise.^{158,160} The Association of Local Government Ecologists report difficulties in recruiting and training ecologists.¹¹⁶ Ecologists can be pooled at the county council level, but a varied skill set is required, such as understanding BNG financing models.⁶⁵ Defra are committed to allocating new burdens funding under the Environment Act, but this is agreed on a single year basis.^{198,199} The Home Builders Federation raise concerns that without adequate resourcing planning system delays will increase.²⁰⁰ The Association of Directors of Environment, Economy, Planning and Transport suggest that limited LPA capacity means only riskiest biodiversity gain plans are likely to be fully assessed.⁶⁵ Natural England have produced checklists for triaging.⁹¹ There are also concerns around the skills and capacity gap in consultant ecologists with relevant metric, habitat creation, maintenance and monitoring skills. There may be lags in graduates reaching the required levels of competency.^{116,65,125,119,201}

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