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Counting on Net Gain

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Biodiversity net gain: a great start with a long road ahead

Government has taken an enormous step towards Lintegrating nature into the planning system in biodiversity.¹ We need to be clear-eyed on the distinction England, preventing 'death by a thousand cuts' for between green infrastructure, access to nature, and biodiversity and contributing instead to the recovery of habitats and species. There is much to applaud in the BNG system for major and minor projects and, very soon, one hopes, for Nationally Significant Infrastructure Projects and marine net gain. New as this is to England, many countries have already adopted similar systems over the Landowners providing ecosystem services and last 30 years. My experience has been that the lessons learnt are strikingly similar worldwide.

A key lesson is that, far as we have come in England, national BNG systems take decades to establish and improve. A roadmap would help to fill the remaining gaps in law and policy, governance and planning.

Another lesson is the importance of clear, consistent and streamlined rules and administration by the different parts of government. It is essential to have a registry supported by digital geographical information systems maps for gain sites, rather than static maps, and comparable standards for on-site gains (managed by the Ministry of Housing, Communities and Local Government) and for off-site ones (managed by Defra). Adequate capacity in local government for monitoring and enforcement is equally vital.

There are striking advantages in decentralising decision-making and implementation to the landscape, watershed and regional levels, particularly land-use planning that crosses political jurisdictions and is guided by local communities. This helps with spatial planning to locate development and agriculture, tackle cumulative impacts, and deliver 'more, bigger, better and joined up'

n mandating biodiversity net gain (BNG), the nature, including through habitat banks.¹ These can prevent bottlenecks for developers and temporal loss of amenity on the doorsteps of new developments compared with true BNG in the wider landscape. Both are needed and, for most developments, require different activities in separate locations.

> developers alike would benefit from planning processes that enable them to apply for BNG, nutrient neutrality, voluntary carbon markets and agri-environment schemes in an integrated application. However, for this to work, the 'avoid and minimise' parts of the mitigation hierarchy must be fortified (e.g. through broader rules on irreplaceable habitats) and any inappropriate substitution between different ecosystem services should be avoided.

> BNG is viewed with both scepticism and hope. If we can apply these and other key lessons from the worldwide experience, there is much to gain for biodiversity and appropriate development.

REFERENCES

Lawton, J.H. (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network. Report to the Department for Environment, Food & Rural Affairs. https:// webarchive.nationalarchives.gov.uk/ukgwa/20130402141656/ http://archive.defra.gov.uk/environment/biodiversity/ documents/201009space-for-nature.pdf (Accessed: 26 August 2024).

Editorial: Kerry ten Kate offers independent advice on how best to integrate the natural environment into economic decision-making. She founded and led the Business and Biodiversity Offsets Programme (known as BBOP): 100 companies, banks, government agencies, nongovernmental organisations and experts worldwide working for BNG. She is a non-executive board member of Finance Earth and a trustee at the Royal Society for the Protection of Birds. She was formerly a board member of Natural England and a member of the Natural Capital Committee.





Cover design: Bold, mischievous and playful, Sam Wilde is a multidisciplinary British artist who crafts imaginative fine art patterns packed with personality and immersive detail. Sam's award-winning artworks subvert audiences' expectations by flipping pattern design on its head with his signature hand-drawn worldbuilding approach. https://samwilde.uk/



FEATURE

Brownfield regene Jon Davies and Tom of applying net gain

FFATURF Digital tools for b

Dan Carpenter inves with developing dig

OPINION

Embedding marin Bruno Agochukwu biodiversity improve

OPINION

What will biodive Rico Wojtulewicz sp for the housebuildir

18

26

42

INTRODUCTION

Biodiversity net gain: the world-leading policy to enhancing nature

Nick White evaluates the first six months of a revolutionary approach to nature and development.

CASE STUDY

Warwickshire County Council's pioneering biodiversity net gain journey

David Lowe recounts a council's ground-breaking exploration of what is now an England-wide policy.

ANALYSIS

How can nature be part of the solution in times of accelerated growth?

Ian Houlston looks at what needs to change for the environmental net gain principle to lead the planning and design of new development.

CASE STUDY

Alscot Biodiversity Project: the UK's first private biodiversity net gain site

Emma Holman-West discusses how Alscot broke new ground with its approach to biodiversity.



CONTENTS	
eration and biodiversity net gain Henman discuss the challenges and opportunities to brownfield development.	12
iodiversity net gain stigates the need for and challenges associated tal tools and systems that are fit for purpose.	34
e net gain into offshore windfarms explores key barriers to the development of marine-related ments.	66
rsity net gain mean for smaller builders? Teaks out about the challenges posed by the policy g industry.	92
rsity net gain mean for smaller builders? beaks out about the challenges posed by the policy g industry. SPECIAL 2024 IES photography competition The highest-scoring images from this year's competition.	92 50
rsity net gain mean for smaller builders? beaks out about the challenges posed by the policy g industry. SPECIAL 2024 IES photography competition The highest-scoring images from this year's competition. CASE STUDY Mandatory biodiversity net gain six months on Ellie Savage and Ethny Childs consider the challenges, oppor and next steps for this ambitious policy.	92 50 56
rsity net gain mean for smaller builders? beaks out about the challenges posed by the policy g industry. SPECIAL 2024 IES photography competition The highest-scoring images from this year's competition. CASE STUDY Mandatory biodiversity net gain six months on Ellie Savage and Ethny Childs consider the challenges, oppor and next steps for this ambitious policy. CASE STUDY Biodiversity, offsetting and net gain in Australia Alan Key and Thomas Key share the lessons learnt from the country's long-standing policy.	92 50 56 rtunities 76

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Biodiversity net gain: the world-leading policy to enhancing nature

Nick White evaluates the first six months of a revolutionary approach to nature and development.

It is rare for a new idea and concept to come along that contains the potential to help address the nature, climate and public health emergencies that we, along with so many other nations, are experiencing. Yet that is the possibility that net gain offers. It is not a silver bullet; alone, it cannot overcome these challenges. But it offers the potential to make a positive contribution. So, what is net gain?

At its simplest it means leaving the natural environment in a measurably better state post-intervention than it was in before through development, land or oceanic management activities. A healthy, functioning natural environment can provide a wide range of benefits to nature and people. More, well-connected and better-quality habitats provide places for wildlife to live and thrive. Those same habitats can in turn provide a whole range of wider benefits, known as ecosystem services. These include flood prevention, food production, shading and cooling, as well as carbon sequestration. They can also enhance human health and well-being – reducing stress levels, combating illness and boosting recovery. Historically, however, the planning system frequently ignored or overlooked the potential for nature to provide these crucial benefits. Unless, that is, a development was proposed that might affect a protected site or species - the minority of sites and wildlife. Nature within development sites was ignored, demolished and built upon, resulting in localised species extinctions and ensuring that residents and communities enjoyed none of the benefits we know nature can provide. There were exceptions to this, such as the award-winning Kidbrooke Village development in Greenwich, London. Here, the developer, Berkeley Group, worked with the London Wildlife Trust and London Borough of Greenwich to enhance existing on-site green infrastructure to significantly improve wildlife abundance, creating wildflower-rich grasslands and reed-fringed wetlands. In doing so they created a new natural asset enjoyed by residents and neighbours alike. However, these types of development were not the norm.

All too often a sorry tale played out, whereby a new development was proposed – say, new houses, offices or factories. Architects and engineers would be employed

to design and develop plans for the site. Shortly before submitting their development proposal to the planning authority for approval, a last-minute attempt would be made to make the project look greener to help secure planning permission. However, with the design already so detailed the ecologist would have little or no scope to suggest anything meaningful beyond a few shrubs or trees around the edges.

Once planning permission was secured, a quantity surveyor would then seek to value engineer many of these green elements out of the project, rendering the nice artistic impressions redundant. Lastly, no thought would be given to managing and maintaining any on-site habitats that survived this final cull into the long term, meaning no benefits for nature or people ever materialised. Far from providing any gains, such projects led to the continued loss of habitats and wildlife. Net gain, and specifically a new policy in England called biodiversity net gain (BNG), aims to reverse this by putting nature at the heart of the development process. In doing so it represents a paradigm shift around what we expect development to deliver for wildlife. Starting in 2024, it is now a legal requirement for many development types to provide a minimum 10 per cent BNG and to provide evidence and a means of ensuring that such gains are managed for at least 30 years.

All developers subject to BNG, by law, must use a statutory biodiversity metric to calculate the nature value of all habitats found within the site before any development activities occur. The same statutory metric is used to demonstrate how the 10 per cent biodiversity gain will be delivered, either within that development site or using land outside the site's red line boundary.

It is not simply a case of providing a 10 per cent bigger area of habitat. The metric requires that the gain comes only from creating higher-quality or better-condition habitats; in other words, you cannot trade down. The metric also accounts for how difficult it is to create such habitats, how long it will take for them to be successfully established and where they will be created or enhanced – on-site or off-site. If the latter, under the metric it is easier to achieve the required minimum percentage gain the closer habitats are to the development site compared to further afield.

Alongside the completed metric calculation, a plan detailing how the habitat is to be managed and maintained for 30 years must be approved by the local planning authority. Finally, habitats created or enhanced to meet this BNG requirement must also be secured – legally so for off-site habitats – which must be



entered into a public register to provide transparency and accountability of delivery outcomes.

This is a revolution in terms of how developers and planners think about and consider nature. Although it has not come without its teething issues, this new BNG requirement is already leading to significant improvements when it comes to nature.

First, it is reinforcing the mitigation hierarchy, an established environmental principle that calls for development to avoid, mitigate then offset (in that order) its impacts on nature. The statutory biodiversity metric ascribes a value between zero (for sealed surfaces and hardstanding) and 8 (for extremely rare and important habitats) for all habitat types found in England, including those along the coast and in urban areas. This means that, for the first time, every habitat type is valued and counted.



Developers are increasingly seeking to avoid, wherever possible, impacting higher-value habitats and to work with and incorporate existing nature into their development sites, making it easier for them to achieve BNG.

Second, and linked to the first point, developers are now considering nature at the site selection and outline design stages rather than as an afterthought. Scheme developers seek to actively reduce their impact on higher-value habitats and to retain and enhance on-site habitats as much as possible. Where on-site gains are not feasible, practically or ecologically, and developments have to meet their BNG requirements off-site, the statutory biodiversity metric incentivises that, where land is available, developers do so locally and in areas that contribute to local nature recovery.

Third, BNG is also fostering a team ethos and breaking down professional silos and barriers, encouraging

ecologists, landscape architects, engineers and planners to collaborate in order to achieve the best scheme outcomes. BNG is also leading to the upskilling of management companies and contractors involved in the longer-term management and maintenance of sites.

Fourth, BNG is leveraging private finance for nature recovery. The requirement to manage and maintain habitats for 30 years and for developers to pay the full cost of any off-site habitats they need to meet their BNG requirement is resulting in the establishment of a new regulated nature market. We have already seen significant investment in new off-site habitat sites – often referred to as habitat banks – to meet the needs of developments. This in turn creates new financial opportunities for private, public and voluntary sector landowners: developers need to purchase newly created or enhanced habitats in the form of biodiversity units, fully financing 30 years' worth of habitat creation, management and maintenance.



With the policy only just six months old, it is still too early to point to ecological outcomes that BNG has delivered. While on its own BNG cannot fully address the problem, early signs from the changes in practice are promising; it can lead to a change in approach and, in doing so, help both nature and us.

The intentions do not end there, however. Work is already underway to explore what an approach to marine net gain might look like in the seas around England. BNG only applies down to mean low water (low tide). However, through marine developments such as offshore wind farms there is a real opportunity to extend the principle.

At the outset, I mentioned how habitats can also provide a range of ecosystem benefits. These are influenced by the type and quality of habitat. Assessing changes in these and other ecosystem services is part of wider work looking at environmental net gain. Some local planning

INTRODUCTION

authorities and developers are already building on new and emerging tools and techniques to explore how to optimise and widen BNG in a manner most relevant to a given place.

The introduction of this mandatory BNG requirement through the planning system, and the use of a standardised biodiversity metric to calculate it, may be happening in England but it is world-leading. Other jurisdictions are watching with interest, with a view to adapting and applying it to their own circumstances. The metric itself, and some of its early predecessors, has gone global, with variants now in use in places as diverse as Saudia Arabia, the US, the Netherlands and India.

Making BNG mandatory in England is the first time any government anywhere has introduced a legal requirement of this type. This has also attracted global interest and attention, including from transnational bodies such as the World Economic Forum and the



Taskforce on Nature-related Financial Disclosures. There is nothing about BNG that prevents other countries from developing similar approaches, albeit adapted to fit local legal and planning frameworks.

Here in England, though, it is important that we do not rest on our laurels. The policy is new and its implementation has not been without hiccups. It is important to continue the work already undertaken with all stakeholders to build consistency and competency. The great thing to date about BNG has been the willingness and readiness of all sectors and professions concerned to work together, share experiences and build best practice. This must continue.

Equally, it is imperative that the 30-year management and maintenance requirement materialises if we are to ensure confidence and credibility, avoid accusations of greenwash and deliver the biodiversity benefits promised. This requires the provision of accurate, independent and verifiable information and an ability and capacity to act on it. It also requires ongoing and continuous improvement to ensure all BNG, on- and off-site, is delivered and maintained to a good standard through continuous training of land managers and contractors, through public engagement and awareness, and through a willingness to intervene and, if necessary, enforce against delivery failure.

Technology can assist us. BNG has generated a community of technology start-ups bringing products forward that speed up and smooth out BNG design, off-site unit purchase, planning and monitoring. Machine learning and artificial intelligence also show real potential, opening up possibilities to revolutionise the support available to ecologists, landscape architects and planners in habitat identification and monitoring, among other fields. Technology also has the potential to streamline BNG processes for developers. These technologies, combined with the rich sources of BNG-relevant information, resources and data already available from Local Environmental Record Centres nationwide and existing national datasets all have a key role to play.

Net gain is an exciting new area of environmental policy and practice, and we are already seeing positive and inspiring changes. However, we are still at the start of the journey, and as such will benefit from continued joint working and support to ensure we realise BNG's full potential. ES

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Biodiversity Net Gain Virtual Symposium 12th February 2025 10:00 – 13:00

Tickets: £25



INTRODUCTION



Brownfield regeneration and biodiversity net gain

Jon Davies and Tom Henman

discuss the challenges and opportunities of applying net gain to brownfield development.



FEATURE

Even before coming to power in July, the new Labour Government was already talking about its ambition to significantly increase the number of houses built across England. While many of the headlines will no doubt focus on the Green Belt battleground, the polarised debate around housing and nature frequently misses the point (as polarised debates generally do): often it is brownfield land – those scraggy, little, fenced-off pockets of sand piles, aggregate and scattered buddleia - that is of greater nature conservation value than the 'green and pleasant land' around our towns and cities and in the wider countryside. This becomes especially pertinent when considering biodiversity net gain (BNG). This is the new legislation that requires developers in England to deliver at least 10 per cent more biodiversity post-development for that lost. This often comes with a need for extensive offsetting, as it may not be possible to achieve BNG within the development curtilage due to economic or space constraints. The market price for BNG units is currently around £20,000–40,000 per unit, which needs to be tied in for 30 years, so is not a light undertaking.

Any developer directed towards brownfield land by government policy will rightfully feel indignant if they find that the BNG offsetting burden is greater, not lesser, than would be the case for many greenfield sites. This is because the latter often constitute relative biodiversity deserts (such as arable land or green dairy pasture) while brownfield sites frequently support relatively uncommon ephemeral and low-nutrient habitats such as open mosaic habitat on previously developed land (not to mention rare species, especially insects and other invertebrates). This means that there is a higher baseline in biodiversity assessments making BNG harder (and more costly) to achieve (see **Box 1**).

OPPORTUNITY OR CONSTRAINT?

So it should not be assumed that BNG is necessarily an opportunity for developers of brownfield sites; it can be a constraint, especially for sites that have been left to nature for a few years. Of course, avoiding the loss of higher-value habitats in the first place makes it easier to achieve BNG, although the ephemeral nature of biodiversity on brownfield sites does mean that it can often be reinstated relatively quickly compared to other habitats.

The challenges can be exacerbated when remediation of land contamination is required – again, mainly an issue for brownfield sites. Land remediation, while a public good, is not considered a direct benefit in



▲ Figure 1. The former clay-brick works site as it is now, following 10 years of inactivity. (© Jon Davies)

BOX 1. THE WRONG SITE?

A recent project involved plans to build a new film studio on what was formerly a clay-brick pit (see **Figure 1**). The developer had bought the postindustrial land not realising that, while the brick works had only closed a handful of years previously, the site had, in the intervening period, filled with water and developed some impressive reedbeds. The site also now supported a variety of other valuable open mosaic habitats of importance for birds, reptiles and great crested newt. It had also, unbeknown to the developer, been designated a County Wildlife Site.

To achieve the required biodiversity net gain (BNG) for the proposed development, the project had to deliver a whopping 430 biodiversity units on a bespoke offsetting site nearby, likely to cost millions. And because of the BNG trading rules – designed to ensure that rarer habitats cannot be offset by the creation of equally high-scoring but more common habitats – this required the expensive re-creation of the habitats due to be lost. Ironically, the proposed offset was situated on poor quality arable land that would have been a significantly cheaper option as the location for the development... Despite these complications the proposed development was granted planning consent, but the developer has since withdrawn from the project.

environmental net gain methodologies. Indirect benefits such as improving water quality or the ecological value of a river are considered, but the removal of contamination risk (to people and the environment) and beneficial reuse of land are not; neither is there any consideration of the impact on soil quality or function (positive or negative). The Environment Agency has recognised this gap and commissioned a pilot project, to be delivered by the British Geological Survey and Jacobs, to evaluate the sustainability benefits from remediating and redeveloping contaminated brownfield sites.¹

Where remediation is required to support development, it needs to consider how site restoration will affect BNG requirements. 'Bad' restoration (in BNG terms) often comprises capping with high-nutrient topsoil and sowing with vigorous grasses that then predominate. Reinstating a site in this way misses opportunities to enhance biodiversity, and importing topsoil to cap nutrient-poor brownfield land can also be very expensive.

There are many examples around the country where the presence of open mosaic habitat on previously developed land is proving to be a headache for developers who had wrongly perceived their site as a wasteland. So what is the solution?

Firstly, choose your brownfield site well; not all brownfield sites are the same, and their constraints (and opportunities) will vary widely. Anything largely comprising hardstanding (e.g. buildings or roads) will generally support very little biodiversity but may require more site preparation – for example, the removal of reinforced concrete or below-ground obstructions. Conversely, a site with friable, sandy habitats with sparse vegetation may be less geotechnically constrained but is likely to be a BNG and invertebrate paradise. The solution, of course, is to consider all potential constraints and the links between them, as well as the opportunities, at an early stage to inform both site selection and subsequent master planning.

While BNG might be a significant constraint to the development of some brownfield sites, it can also be an opportunity. Such sites are often seen by their owners as liabilities rather than assets – especially if there is no clear potential for residential or commercial development – whether for reasons of contamination, location or lack of infrastructure. However, with relatively low levels of management intervention, a site that is scrubbing over with bramble or buddleia (or, worse, Japanese knotweed) could offer potential for biodiversity offsetting, not least through the restoration and long-term maintenance of open mosaic habitat, providing potential BNG offset units for impacts on other brownfield sites.

And if designed well, these brownfield offsets can also deliver other natural capital benefits that could lead to alternative or additional income streams to BNG. This environmental net gain could include reducing the risk of flooding (e.g. through the creation of attenuation basins), improving water quality (e.g. through the introduction of reedbeds), supporting active travel or other recreational activities, or increasing people's enjoyment of nature through the inclusion of nature trails and other educational facilities. Various natural capital accounting calculators, such as the NATURE tool, have been developed to assess these improvements, whether quantitatively or qualitatively.² Other alternatives for beneficial reuse of brownfield sites include renewable energy generation (e.g. through solar photovoltaic panels, onshore wind or ground-source heat) and energy storage, which can sometimes be combined with biodiversity and environmental net gain.

BOX 2. THE IMPACT OF REMEDIATION

The former Grassmoor tar lagoons site in Derbyshire was successfully remediated in the 2010s to support beneficial reuse of the site as a country park. The £5 million project involved bioremediation of contaminated materials as well as a major landscaping scheme, filling in most of the open void and restoring the site back to amenity grassland. The project was completed before biodiversity net gain (BNG). was a statutory requirement; therefore, biodiversity enhancement was not a prime driver for the remediation but it was a consideration.

The remediation was successful in providing a large area of land available for amenity and recreation. It also achieved a successful outcome for protected ecological species and established a large area of flower-rich, neutral grassland. However, it also led to an overall loss of habitat diversity and heterogeneity, and to the loss



▲ Figure 2. Habitat map of the site before remediation, illustrating the range of habitats. (© RSK Biocensus)

of some woodland, ephemeral plant communities, scrub and wetland edge habitats due to the need to disturb them for the remediation works to proceed.

Biodiversity data for the before (see **Figure 2**) and after site conditions was assessed against the Defra metric to gauge whether BNG was achieved. Due to the low-fertility soils used in the site restoration, and because species-rich grassland was retained around the periphery as part of the landscape design, a flower-rich seed rain turned the planned amenity grassland into a more diverse flower-rich sward compared to what it was before. So, despite some loss of habitat variety, the much larger area of flower-rich grassland (see **Figure 3**), which scores well in the BNG metric, meant that, overall, the remediation project led to a 10 per cent net gain.



▲ Figure 3. Habitat map of the site postremediation, illustrating larger area of high-scoring, species-rich grassland habitat (coloured orange). (© RSK Biocensus)



Naturally, the options for environmental enhancement are more limited where contamination levels are high, and remediation requirements are likely to be relatively draconian. But even in these circumstances a well-designed post-remediation biodiversity plan can significantly compensate for the clean-up costs. For example, over the years, many landfill sites have been capped with topsoil and sown with a monoculture of rye grass; this is a significant missed opportunity, since using subsoil rather than (very expensive) topsoil allows for the creation of much higher-biodiversity (and, critically, lower-maintenance) habitats (see **Box 2**).

The issue of brownfield development, remediation and BNG is complex. One person's headache is another's opportunity. But there are nuances, not only in the value (and by extension the impacts and benefits) of the habitats involved but also in the uses – and potential income streams – available for subtly different plots of land, depending on site conditions and other local factors. Ultimately, any brownfield land that is simply left to its own devices and seen as a liability to be tolerated on the balance sheet is likely to be a missed opportunity. But it is critical to know both what the nature of the site is and what nature is present to properly determine an appropriate response.

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REFERENCES

- Beriro, D. and Macklin, Y. (2024) Remediation and sustainable growth tool: development of natural capital metric for land remediation. SiLC Natural Capital webinar [online], 20 June 2024.
- 2. NATURE Tool (2024) Home page. https://nature-tool.com/ (Accessed: 2 September 2024).



Warwickshire County Council's pioneering biodiversity net gain journey

David Lowe recounts a council's ground-breaking exploration of what is now an England-wide policy.

T t was a Tuesday morning in the last week of September 2011. In a wood-panelled Nuneaton committee room, surrounded by senior strategic planning officers for the subregional local authorities of Warwickshire, Coventry and Solihull (WCS), our team had just presented the draft consultation of the WCS Green Infrastructure strategy.

This document identified and mapped, among other things, green infrastructure assets and how they formed ecological corridors at local, parish, district, subregional and national levels. It also identified strategic areas where ecological creation and enhancements should be targeted. Over many years the team had witnessed habitats such as ancient wildflower pastures and pockets rich in wildlife being incrementally lost to development. As a result, biodiversity was suffering death by a thousand cuts. So the introduction of a new strategy to tackle biodiversity loss was a welcome development.



The chair announced the next committee item on biodiversity offsetting, which was a call from Defra for volunteer authorities to trial a new approach to considering biodiversity in planning. This would be a way to value all habitats on a development site through a proxy metric for which the algebraic components were suggested but not yet formulated; a way to measure biodiversity before and after development and inform appropriate compensation; and a way to enact the recommendations of the WCS Green Infrastructure strategy. We requested and received council support to submit an expression of interest to volunteer for this trial.

Enacting the WCS Green Infrastructure strategy was not the only reason for suggesting the subregion became a biodiversity offsetting pilot. Early indications of the then-forthcoming 2012 National Planning Policy Framework (NPPF) exuded a quiet confidence when it came to wildlife protection. We saw this new policy as a potential new funding pot and an opportunity to grow the region's local authority ecology teams.

THE BIODIVERSITY IMPACT CALCULATOR

On April Fool's Day 2012 it was announced that six council groups in England had been chosen to commence piloting a compensation metric to be used within the planning system. The fact that only six had applied was, perhaps, irrelevant. Warwickshire County Council (WCC) had already begun to apply its own metric in November 2011 on a site that had been designated as both a local wildlife site and strategic housing site within a borough authority's Local Plan. From bitter experience we knew the need for housing trumped ecology. The developer, however, was understanding and wanted to demonstrate that they were sensitive to the site's ecology. In so doing, version 1.0 of the Warwickshire biodiversity impact assessment (BIA) was born.

The six pilot councils attended several Defra and Natural England workshops. At the first workshop we went through the documents already produced and the philosophy of 'no net loss' outlined in the NPPF, which



by now had come into effect. The NPPF recommended that no net loss to biodiversity was 'reasonable' and only once the mitigation hierarchy (avoid, mitigate and, as a last resort, compensate) had been applied.

At the second workshop, we explained that we had applied a metric to several planning applications, where developers had only asked how much compensation money WCS wanted. It was suggested at the time that money should not come into it and that one should only trade in biodiversity units. This was a language that neither ecologists, local planning authorities nor developers understood. Although pilot councils were asked not to talk to each other so that and independent exploration of how a metric approach might work, we ended up meeting twice to share ideas and learning, with Defra and Natural England in attendance. All six pilots were also given a Natural England officer to assist; our officer was enthusiastic, dedicated and a great help, despite being on the same learning trajectory.



In the second year the BIA was adapted into version 3.2 and on 4 April 2013 WCS went to a planning appeal for a contested development. All parties supported the metric approach; however, the planning inspector had questions regarding the use of the metric. Coincidentally, at this time, WCS was also in the process of responding to the Secretary of State for the Environment to update him on biodiversity offsetting pilot programme progress. We explained that the WCS metric demonstrated the NPPF requirement for the planning system to enhance the natural environment by 'minimising impacts on biodiversity and providing net gains where possible'.¹ By valuing habitat that was lost before and that created after development, the metric was directly related to the scheme and was fair and reasonable, according to the Community Infrastructure Levy tests. The inspector agreed and a major legal barrier vanished.

In 2013 a partnership was formed with Environment Bank, where WCS would generate biodiversity units

and Environment Bank would identify and create compensation offset sites. Regrettably, Environment Bank withdrew from the partnership two years later, as too few developments that had signed obligations to offset their losses had commenced development. This was not due to offsetting requirements but to the state of planning at the time and to alleged land banking. Environment Bank also proposed a concept called habitat banks and invested considerable resources into their establishment. Unfortunately, WCC considered the concept too risky and withdrew, although it was later proven to be viable. Together, we looked at using the same BIA for both development and offset sites, and the BIA evolved at pace to version 17.0. Other trading rules were introduced, such as only grassland being able to compensate for grassland losses and woodland for woodland losses.

FINE-TUNING THE CONCEPT

Later in 2013 another major development scheme was brought forward on which the applicant, their ecological consultant, the Environment Agency, Warwickshire Wildlife Trust and WCC worked together. Together we reformed the BIA and fine-tuned the time-to-targetcondition (the time it takes for a habitat to reach its target wildlife richness) and the 'difficult-to-create' multiplier factors (the potential for the habitat to fail) that formed part of the metric. WCC also verified the trading-down rules so that a lower-value habitat could not compensate for a higher-value one (e.g. a homogenous grassland could not contribute to the compensation for the loss of a wildflower meadow). In addition, we created an indirect impacts section that calculated harm to habitats that were outside the application area. Thus, version 17.3 of the BIA was formed and the science behind the formulas fully explored and tested.

This combined expertise of all parties influenced the metric development's concept and design. Scenarios were put into the metric and financial viability was tested against the mitigation hierarchy. The very large and complex development scheme was finalised and submitted for planning approval within six months with all ecological issues resolved. The BIA methodology enabled a framework for discussion and formed a common language that was open and transparent. The other lesson was that this was a habitat metric: species had to be dealt with first and separately.

In the two to three months that followed, minor tweaks were made from other lessons learnt and version 18.3 was launched, which remained in force until 2019 when version 19.1 was released. This latest version used the same formula but included ecosystem service impact graphs and a built-in financial calculator that informed developers how much, indicatively, an offset contribution to WCC would cost to compensate for their loss: a local tariff. However, the calculator was set at a price that would encourage developers to find or arrange for their own off-site scheme. WCC's local tariff included a 10 per cent surcharge insurance fee, plus a 20 per cent regulatory fee. The latter was to cover the monitoring officer's costs.

In the meantime, the NPPF was revised to include 'measurable biodiversity net gains'. By 2015 all WCS local authorities had planning policies in place securing this approach. From this point, biodiversity offsetting became pseudo-mandatory. On 2 April 2023, the BIA's legacy product – the statutory biodiversity net gain (BNG) metric – became mandated through the Environment Act 2021 and the Warwickshire BIA was consigned to history.

OFF-SITE COMPENSATION AND CHALLENGES

Since 2015, £9 million has been secured for biodiversity enhancements, the majority being spent on grassland creation and enhancement. Very few woodland and watercourse habitats were being impacted by developments; it was expensive to offset these habitat types, which demonstrated that the BNG philosophy to avoid high-value, wildlife-rich habitats in the first instance was working. Applying the metric was reducing the ecological death by a thousand cuts. However, this created a legacy problem in that the planning process only assisted in recovering grassland habitat. How could wetlands and woodlands be restored? BNG was only partially enacting the WCS Green Infrastructure strategy.

Before withdrawing, Environment Bank had created a few offset sites, but it was just after their departure that WCC began accruing contributions and needed to find compensation sites. To address this, an officer was employed to assist landowners in creating offset sites. The first such site created was Ryton Pools Country Park, followed by a former landfill site called Hell Hole (both owned by WCC); after that, further sites were created on both local authority and privately owned land. All offset sites were secured by a section 39 Wildlife and Countryside Act 1981 agreement, which enables local authorities to have legal agreements with landowners for nature conservation purposes.² These agreements give annual payments to the landowner to enact a management plan. WCC also used this legal instrument to enable the first private scheme to sell units directly to the market, for which the council received a regulatory fee per unit sold.

The implementation of the mandatory BNG policy in 2024 led to section 39 agreements becoming obsolete. By law, only offset sites secured though conservation covenants or section 106 agreements can be admitted to the statutory national BNG register. Landowner conservation covenants can only be brought forward



Figure 1. Timeline of the development of the Warwickshire, Coventry and Solihull biodiversity offsetting frameworks from 2012 to 2024.

through responsible bodies, which must be appointed by the government. Therefore, WCC was forced to become a responsible body to be able to hold conservation covenants and to continue implementing BNG in Warwickshire.

NATURE MARKETS

In 2021, WCC won a Natural Environment Investment Readiness Fund grant to explore other regulatory (mandatory) schemes akin to BNG. This supported Warwick District Council with its net-zero carbon policy. In 2024 a mandatory WCC carbon market was established, which requires a compensation payment from developers to cover the costs for creation of a woodland and its 100-year management period. WCC is also investigating water markets within an international partnership, as well as a great crested newt district-level licencing scheme that will be integrated with the statutory metric (subject to government approval). There is also a sky lark compensation package.

WCC believes that the more nature markets that operate in Warwickshire, the more security landowners and investors will have in making a return on their biodiversity ventures. For example, a woodland creation project could sell woodland carbon, woodland water and BNG units, all governed through a conservation covenant. All these and any future markets form part of the WCS ecosystem services trading protocol, which is Annex A of the refreshed forthcoming WCS Green Infrastructure strategy. Annex A is expected to go to consultation in autumn 2024.

NATURAL CAPITAL INVESTMENT

The Environment Act 2021 saw the end of WCS's local BNG tariff. However, £7 million has already been secured as part of WCS's initial work, much of which is committed as annual payments. This posed the question of how the allocated but not-yet-passed-to-landowners monies could be used. In 2024, WCS prepared a Natural Capital Investment strategy describing how it would use the income raised from environmental markets and nature-based compensation schemes (including that £7 million) to enhance nature and the environment, and the co-benefits to people, and to help tackle climate change. A pending implementation plan will detail how this can be done. WCC hopes that the strategy will promote offset sites in strategic opportunity areas in order to deliver the WCS Green Infrastructure strategy and the forthcoming Warwickshire Local Nature Recovery strategy.³ It is envisaged that the Natural Capital Investment strategy will fund the establishment of more nature markets to create even more investment opportunities.

The WCS had insisted on net gains to ensure a supply of units. Without this, the venture would have failed. The WCS team received the recognition it deserved with the 2019 Chartered Institute of Ecology and Environmental Management Planning Authority of the Year award, which is shared with district and borough colleagues.

Acknowledgements

This success would not have been possible without our team and the support from the WCS's planning authorities. Establishing BNG in those early days was not easy, as we absorbed the work into an already overworked team. We are also grateful to the developers who in general supported the approach: they welcomed the certainty the metric provided; they could forecast their biodiversity expenditure early in the build process; and there were fewer surprises. Developers were also happy that compensation could be provided locally.

David Lowe, BSc (Hons), MCIEEM is the Service Manager for Ecology, Historic Environment & Landscape at WCC having been at the Council since 2004. His team comprises 15 ecological, five historic environment and two landscape officers whose remit is to protect, restore and enhance Warwickshire's natural and historic environments. David was instrumental in WCC's participation in the Defra biodiversity trial, which was the foundation for today's BNG policy.

🔭 www.warwickshire.gov.uk/ecology

REFERENCES

- Ministry of Housing, Communities & Local Government (2012) National Planning Policy Framework, section 11, para 109. https:// webarchive.nationalarchives.gov.uk/ukgwa/20180608213715/ https://www.gov.uk/guidance/national-planning-policyframework (Accessed: 17 September 2024).
- UK Public General Acts (1981) Wildlife and Countryside Act. https://www.legislation.gov.uk/ukpga/1981/69/section/39 (Accessed: 17 September 2024).
- Department for Environment, Food & Rural Affairs (2023) Local nature recovery strategies. Policy paper. https://www.gov.uk/ government/publications/local-nature-recovery-strategies/localnature-recovery-strategies (Accessed: 17 September 2024).

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How can nature be part of the solution in times of accelerated growth?

Ian Houlston looks at what needs to change for the environmental net gain principle to lead the planning and design of new development.

The new UK Government has plans to accelerate infrastructure delivery to build 1.5 million new homes in the next five years, including in areas designated as Green Belt. It was also elected on a platform to deliver for nature. Can these two goals be reconciled?

A LOOK AT NATURE PROTECTION IN ENGLAND

England's rich and varied landscape is our most precious asset. The diversity we see and experience today is the result of the complex interplay of natural and cultural forces over millennia. The toil of generations making best use of the natural resources in their local environment is etched into the fabric of cities and towns and can be detected in the patterns created by roads, settlements, parklands, fields, moors and forests. Our landscapes have inspired our finest artists and writers. They are intrinsic to our collective identity and sense of place.





While that is still their power, by the start of the Victorian period and with the Industrial Revolution fully underway, there was very little, if anything, left of a truly natural environment in England.

Landmark legislation introduced by the Attlee government, the National Parks and Access to the Countryside Act 1949, is still the foundation of modern biodiversity and environmental policy.¹ This act protects our most valued landscapes and habitats through designation – as National Nature Reserves, Sites of Special Scientific Interest, National Parks and National Landscapes (formerly known as Areas of Outstanding Natural Beauty).

For the next 60 years, urbanisation, industrialisation and the intensification of farming practices continued to lead the deterioration and loss of wildlife habitats on an unimaginable scale. Legislation and policy continued to strengthen nature protection but failed to prevent the UK from joining the planet's top 10 per cent of the most nature-depleted nations and territories.²

THE TURNING POINT

Professor Sir John Lawton's review of England's wildlife sites in 2010 was a defining moment.³ He pointed out that protecting the natural world was not an optional luxury, and that a step-change was needed in our approach to large-scale habitat restoration and re-creation. Importantly, he argued that we had to re-establish ecological processes to simultaneously benefit both wildlife and people. This fundamental principle was amplified by Professor Sir Partha Sarathi Dasgupta in his review of the economics of biodiversity, published in 2021.⁴ Dasgupta warned that our relationship with nature was endangering current and future generations, and that truly sustainable economic growth and development means recognising that our long-term prosperity relies on rebalancing our demand of nature's goods and services with its capacity to supply them.

In 2018, the 25 Year Environment Plan embedded an environmental net gain principle for development that has continued to find its way into national and local policy.⁵ The plan adds a wider focus to that on biodiversity alone, as it requires the improvement of natural capital assets and the ecosystem services they provide when planning how to deliver biodiversity net gain. Then, the Environment Act 2021 provided powers to set new binding targets, including for air quality, water, biodiversity and waste reduction.⁶ The act introduced the requirement for now-mandatory biodiversity net gain and, importantly, a Nature Recovery Network.

Galloping towards us now is the Environmental Improvement Plan apex goal of halting the decline in species abundance and protecting 30 per cent of our land and sea for nature by 2030.⁷ But the needs of nature are not yet being balanced with the current scale of development. In many rural and urban areas of England we are at a standing start, with habitats too small and fragmented to work as viable networks.

A review by the United Nations (UN) Environment Programme, UN Office for Project Services and the University of Oxford found that nature-based solutions can influence 79 per cent of Sustainable Development Goal (SDG) targets across all 17 SDGs.⁸ These solutions are defined as:

'Actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.'9

However, this review also found that there are multiple uncertainties, challenges and constraints to replacing conventionally engineered solutions. Nature-based solutions (in the form of green and blue infrastructure) often require longer timescales to achieve their full potential; they need more monitoring, management and maintenance, and there is a national shortfall in our technical and institutional capacity to assess, design and deliver them.

The shortage of reliable evidence and data related to the benefits and costs of green and blue infrastructure is also a significant constraint to their widespread adoption. A product like concrete performs predictably. Contrast this with the complexity of the carbon cycle in soils and vegetation or with natural flood management measures where local conditions and changes over time may influence performance.

There are dramatic examples of the risks faced in dense, urbanised places. Dubai in the United Arab Emirates was brought to a standstill in April 2024 when the city experienced the kind of extreme weather event that is becoming increasingly common, and its predominantly grey infrastructure was overwhelmed.¹⁰ Nature-based solutions, with soft landscapes and generous tree canopy cover, could have helped intercept some of this rainfall and reduced run-off. While not the complete answer, green and blue infrastructure, unlike grey infrastructure, can perform many functions. For example, greening city spaces starts to break the carbon-intensive cycle, making walking and cycling more viable alternatives to vehicle use.

The UK Green Building Council provides a case study that explores the design and cost implications of delivering low-carbon residential developments that incorporate nature-based solutions. The study



looks at the 750-home Trumpington South scheme and reveals a number of easy and cost-effectiveness design interventions that can be applied to achieve significant embodied carbon savings, which also deliver wider benefits including enhanced climate resilience, increased nature and biodiversity and improved resident amenity.¹¹ The study showed that increased tree coverage provides real-world benefits, including flood risk mitigation and reducing the risk of overheating during summer months, thereby improving thermal comfort and occupant well-being. With the number of extremely hot days in the UK (exceeding 25C) potentially doubling with a 2C global temperature increase, homes that are adapted to a changing climate (i.e. that will not require costly retrofits to improve insulation or the addition of air conditioning) will be more attractive to prospective homebuyers.¹²

SO WHAT NEEDS TO CHANGE, AND FAST?

Landscape architecture is a profession that straddles art and science by fusing biological and cultural ecology in the creative design process. But it needs far more science in the mix. From now on, every development and design team should be asking this question: what is the role here for ecologists, arborists, environmental scientists and data analysts to show what nature-based solutions can do to create the environmental infrastructure we need, optimise spatial arrangements and create places where people want to live, work and play?

This entails looking afresh at development sites and their landscape context, and understanding what habitats are present and the range of ecosystem services they deliver. This can inform what should be retained, protected and enhanced, with the evidence to support investment. For example, it is environmental scientific analysis that can assess the carbon per hectare of different types of woodland and their capacity to perform other beneficial functions, and then use this to inform decisions about what, where and how to plant and manage trees for optimised outcomes.

In delivering a new community for East Cullompton in Devon, landscape architects, working closely with environmental consultants, developed a master plan that seeks to minimise potential carbon emission sources and increase the benefits provided by nature – from supporting pollinators to improving soil health, natural water management and carbon storage. The approach guided spatial decisions that include avoiding soil disturbance in areas of high carbon storage and creating

ANALYSIS

new areas of woodland and wetland in parts of the site that can deliver the greatest network benefits.

When it comes to analysing the benefits from nature to inform detailed design and decision-making at the site scale, the evidence needs to be robust and accessible. Social enterprise Treeconomics has been doing interesting work to provide carbon performance certificates for trees.¹³ Efficiency ratings (A-E, similar to those found on white goods) are provided for trees in nursery catalogues, giving clear data on which to base decisions. (An A rating indicates the greatest absorption potential.) The certificate also shows how long it will take before the tree offsets the carbon it took to grow, deliver and plant it. We need to build on this example to quantify and consider the other benefits various tree species and other nature-based solutions provide. There is a significant opportunity for research institutes to share evidence on the efficacy, costs and benefits of all kinds of nature-based solutions compared to conventionally engineered ones. There is also the opportunity to explore how artificial intelligence processing and spatial modelling can streamline decision-making. Then policy-makers, clients and investors can start to treat nature-based solutions as a mainstream practice.

There are resources already available to support this work. Natural England's National Character Area Profiles provides an overview of the natural capital assets for each of England's 159 National Character Areas.¹⁴ The profiles link to the Natural Capital Atlas, another Natural England resource that provides the natural capital evidence base for each county and city region.¹⁵ There is detailed information too: the Bedfordshire Local Nature Partnership, for example, has commissioned a detailed natural capital base map.¹⁶ There is also helpful guidance that signposts to published evidence and highlights the benefits of different nature-based solutions. For example, the Forestry Commission has reviewed the delivery of ecosystem services by urban forests and the role of urban trees and green spaces in reducing urban air temperatures.^{17,18}

There are also tools that enable a natural-capital approach and provide a common and consistent means of considering the impacts of land-use change on ecosystem services.¹⁹ For example, the Environmental Benefits from

Nature (EBN) tool – developed by Natural England and the University of Oxford in partnership with Defra, the Forestry Commission and the Environment Agency – uses a habitat-based approach.²⁰ The EBN tool is currently being updated to work with the statutory biodiversity metric and Natural England's Green Infrastructure Standards. Once released later this year, the EBN tool will incorporate new data tools to make its application to planning, design and scenario testing quicker, easier and more integrated.^{21,22}

The scale of the climate and biodiversity crises means that, even if this feels like unchartered territory, there is no time to be lost before making multifunctional nature-based solutions the norm for co-design and place-making. How will you ensure natural capital, the environment and biodiversity flourish in your next design?

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REFERENCES

- Met Office (2021) Climate change shifting UK's high-impact weather. https://www.metoffice.gov.uk/about-us/news-and-media/ media-centre/weather-and-climate-news/2021/climate-changeshifting-uks-high-impact-weather (Accessed: 20 August 2024).
- Treeconomics (no date) Home page. https://treeconomics.co.uk/ (Accessed: 13 August 2024).
- Natural England (no date) Natural England National Character Area Profiles. https://nationalcharacterareas.co.uk/ (Accessed: 13 August 2024).
- Natural England (2020) Natural Capital atlases: mapping indicators for county and city regions (NECR318). https://publications. naturalengland.org.uk/publication/6672365834731520 (Accessed: 13 August 2024).
- Bedfordshire Naturally (no date) Natural capital planning. https:// bedfordshirenaturally.com/natural-capital-investment-planning/ (Accessed: 13 August 2024).
- Davies, H., Doik, K., Handley, P., O'Brien, L. and Wilson, J. (2017) Delivery of Ecosystem Services by Urban Forests. Research report. Edinburgh: Forest Research. https://cdn.forestresearch.gov. uk/2017/02/fcrp026.pdf (Accessed: 13 August 2024).
- Monteiro, M.V., Handley, P., Morison, J.I.L. and Doick, K.J. (2019) The Role of Urban Trees and Greenspaces in Reducing Urban Air Temperatures. Forest Research and Forestry Commission. https:// cdn.forestresearch.gov.uk/2019/01/fcrn037.pdf (Accessed: 13 August 2024).

REFERENCES

- UK Public General Acts (1949) National Parks and Access to the Countryside Act. https://www.legislation.gov.uk/ukpga/ Geo6/12-13-14/97 (Accessed: 13 August 2024).
- Natural History Museum (no date) *Biodiversity indicators*. https:// www.nhm.ac.uk/our-science/services/data/biodiversity-indicators. html (Accessed: 13 August 2024).
- Department for Environment, Food & Rural Affairs (2010) 'Making space for nature': a review of England's wildlife sites published today. https://www.gov.uk/government/news/making-spacefor-nature-a-review-of-englands-wildlife-sites-published-today (Accessed: 13 August 2024).
- HM Treasury (2021) The Economics of Biodiversity: The Dasgupta Review. https://assets.publishing.service.gov.uk/ media/602e92b2e90e07660f807b47/The_Economics_of_ Biodiversity_The_Dasgupta_Review_Full_Report.pdf (Accessed: 13 August 2024).
- Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove (2018) 25 Year Environment Plan. https://www.gov.uk/ government/publications/25-year-environment-plan (Accessed: 13 August 2024).
- UK Public General Acts (2021) Environment Act. https://www.legislation.gov.uk/ukpga/2021/30/contents (Accessed: 13 August 2024).

- Department for Environment, Food & Rural Affairs (2023) Environmental Improvement Plan 2023. https://www.gov.uk/ government/publications/environmental-improvement-plan (Accessed: 13 August 2024).
- United Nations Environment Programme (2023) Nature-based Infrastructure. How Natural Infrastructure Solutions Can Address Sustainable Development Challenges and the Triple Planetary Crisis. Geneva: UNEP. https://content.unops.org/publications/Naturebased-Infrastructure EN.pdf (Accessed: 13 August 2024).
- Nature Based Solutions Initiative (2022) United Nations Environment Assembly agrees nature-based solutions definition. https:// www.naturebasedsolutionsinitiative.org/news/united-nationsenvironment-assembly-nature-based-solutions-definition (Accessed: 13 August 2024).
- University of Birmingham (2024) Weathering the storm: protecting Dubai from future flooding. https://www.birmingham.ac.uk/ news/2024/weathering-the-storm-protecting-dubai-from-futureflooding (Accessed: 20 August 2024).
- UK Green Building Council and Advancing Net Zero (2022) Building the Case for Net Zero: A Case Study or Low-Rise Residential Developments. https://ukgbc.org/wp-content/uploads/2022/03/ UKGBC-Masterplan-Report-version-2.pdf (Accessed: 20 August 2024).

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ANALYSIS

- Department for Environment, Food & Rural Affairs (2023) ENCA featured tools for assessing natural capital and environmental valuation. https://www.gov.uk/government/publications/encafeatured-tools-for-assessing-natural-capital-and-environmentalvaluation/enabling-a-natural-capital-approach-tool-summaries#ekntool-assessor (Accessed: 14 August 2024)
- 20. Natural England (2021) *The environmental benefits from nature tool* – *beta test version (JP038).* https://publications.naturalengland.org. uk/publication/6414097026646016 (Accessed: 14 August 2024).
- 21. Natural England (2023) Introduction to the Green Infrastructure Framework – principles and standards for England. https:// designatedsites.naturalengland.org.uk/GreenInfrastructure/Home. aspx (Accessed: 13 August 2024)
- 22. Department for Environment, Food & Rural Affairs (2023) *Statutory biodiversity metric tools and guides*. https://www.gov.uk/ government/publications/statutory-biodiversity-metric-tools-and-guides (Accessed: 13 August 2024).

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Digital tools for biodiversity net gain

Dan Carpenter investigates the need for and challenges associated with developing digital tools and systems that are fit for purpose.

FEATURE

s a regulatory requirement for planning, biodiversity net gain (BNG) requires an increased focus on data and evidence, particularly for plants and habitats. As such, BNG has sparked significant demand for ecological expertise and requires the collection, management and presentation of ecological data. Achieving deliverable net gain for biodiversity requires good data collection practices so that robust evidence of habitat type and condition are presented alongside the Defra metric (a statutory tool for calculating the impact of development on biodiversity) and assessment of a development's impact on biodiversity, as well as to demonstrate whether it successfully achieves a minimum 10 per cent net gain.¹ Digital tools help ecologists to collect and analyse data more efficiently and accurately, improving the quality of assessments. As BNG evolves, so must ecological practice and the increasing use of digital tools is part of this. But collaboration is important, and standards for both ecology and digital tools must also evolve to ensure we have robust scientific evidence to demonstrate the successes (and failures) of BNG to ensure we learn how to deliver better outcomes for nature.

A surveyor's background, skills and experience have always been important for ensuring a sound ecological assessment. However, before the adoption of BNG, data and evidence for habitat surveys were not prioritised. With BNG it has become necessary to record and report the plant assemblage and relevant abundance of species to classify a habitat according to its UKHab type (e.g. the percentage cover of perennial rye grass (Lolium perenne) or the number of chalk grassland indicator species recorded).² To determine the condition of a habitat, a wide range of data are required - from the water depth of ditches, to the number of dead trees in a woodland, to the amount of bare ground across a variety of habitats. These aspects of the natural environment may have been previously observed, but few were recorded and fewer still assessed quantitatively.

As such, good data collection and good data management have become essential in delivering BNG assessments. A range of digital tools have emerged to assist ecologists in data collection and analysis. Key among them are tools with a particular focus on habitat and condition while understanding and examining data gaps can provide a forward look to where further digital development may benefit ecologists. Data are all-important in BNG assessments, making habitat data sources, their suitability, applicability and accessibility fundamental to the process.

DESKTOP BIODIVERSITY NET GAIN

BNG assessments start from a desktop analysis. Developers are aware of BNG requirements, which has resulted in considering ecology much earlier in a project's development timeline. Ecologists used to lament being brought into projects at a very late stage, after decisions had been made, leaving little room for further design changes. BNG has changed this, with developers often considering BNG implications at the land-buying or options stages.

When a BNG assessment request is made, an ecologist may be provided with little more than a red line boundary on a plan or map. To determine the likely net gain for a potential development site, an ecologist needs to know the habitat types present, their area and condition. (They also need to know the habitats' strategic significance, for which data can be found on Natural England's geodata portal³.)

Most ecologists will turn to geographic information systems (GIS) to digitise habitat boundaries, and both the open-source QGIS and ESRI's product suite provide all the necessary tools for this. A QGIS project is provided with the Defra biodiversity metric, designed to ease the process of digitising habitats and creating the necessary attributes for vector (point, line, polygon) data. The tool also comes with an MS Excel spreadsheet for converting QGIS data so that they can be imported directly into the metric spreadsheet. There are a range of data that ecologists can use to create habitat maps for BNG.

Living England data. Created by Natural England, this provides habitat data for the whole of England, with polygons attributed with habitat types derived from satellite data.⁴ Despite the Defra metric adopting the UKHab classification, Living England does not classify habitats according to UKHab, requiring some translation by the ecologist. While having an England-wide dataset



is useful, the polygons themselves do not follow field boundaries or other obvious features on the ground, and some of the habitat classifications are less useful when it comes to BNG. For example, acid, neutral and calcareous grasslands are lumped into one habitat type, whereas in the Defra metric these grasslands are split into at least 10 different types. Other habitat classifications seem to cover a wide range of types – such as bare sand, for example, which includes arable fields, sand dunes and artificial surfaces.

UK Centre for Ecology and Hydrology (UKCEH) Land Cover Maps. A similar dataset, this is also satellite-derived.⁵ It uses UK biodiversity action plan broad habitat types as its classification system so, again, requires translation into a UKHab format for the Defra metric. Similarly, the data do not align with field boundaries, making it hard to use in some cases, and there are obvious errors in the habitat determination. For example, there is a lot of heather recorded across Wiltshire, most of which is in fact a mixture of arable land and pasture.

Map Impact's BiodiversityView. This third England-wide (and UK-wide) dataset combines a wide range of open-source and satellite data on both habitat

FEATURE

and condition.⁶ The data are presented based on a hexagon grid, with each hexagon assigned a habitat type and condition. As the habitat data used come from sources such as Living England and UKCEH, BiodiversityView inherits some of the classification problems within these datasets. The hexagon format also makes it more difficult to use for individual sites, as it does not follow actual boundaries on the ground that are crucial for planning. However, the condition data are unique to this product and add valuable information not available elsewhere. Condition is derived from a range of satellite indices, pegged to ground-truthed assessments of habitat condition, allowing for a more nuanced assessment than setting everything to 'moderate condition', which is often the default in desktop studies.

None of the three datasets is ideally suited to the scale of a development site, and all suffer either from habitat classification issues or the spatial arrangement of the data. But their value is in large-scale BNG assessment, either for large infrastructure projects – such as for road, rail or energy developments, especially at the feasibility and optioneering stages – or for landscape-scale projects, such as Local Nature Recovery Strategies. The ability to detect changes in both habitat type and condition from satellite data is invaluable for monitoring BNG delivery, both on- and off-site.

Two other UK companies offer a slightly different service: they digitise habitat data and provide their UKHab classifications. Both use satellite data and artificial intelligence to achieve this. The first is AiDash with its BNGAI product.⁷ The AiDash team will take a site boundary and digitise the habitats within it, assign them a habitat type and return it within 10 days. AiDash will even provide an estimate of the habitat units generated by the baseline. The second is Gentian, with a similar offer and equally accurate results.⁸ For small teams with numerous sites to map, these services could be cost-effective in delivering results quickly. However, many ecology consultancies with GIS teams will find they can map sites in less time and with habitat classifications that are accurate enough for desktop studies.

INTO THE FIELD

For ecologists heading into the field to survey habitats, there is an increasing number of apps enabling them to digitally record data on habitats, condition and more. There are two main ones.

The QGIS system. This has matured considerably in recent years, with two well-known field apps for digital data collection: MerginMaps and QField.^{910,11} Both work by allowing users to create projects in QGIS and then upload them to a mobile device for field data collection, either via a paid-for cloud-based service or by direct transfer via a cable or SD [Secure Digital] card. These allow QGIS users to create customised forms to collect



a wide range of data for BNG and beyond, providing great flexibility.

The advantage of using cloud-based service apps like MerginMaps or QField Cloud is that data synchronise seamlessly from mobile to desktop device, and managing multiple users is straightforward. Both services can be self-hosted on an inexpensive virtual machine in the cloud, but this is only available to users with knowledge of servers and cloud infrastructure. Yet even with a manual transfer, errors are minimal.

Users can create their own forms, which leads to a lack of standardisation. The exact data collected will vary by consultancy or individual, with different choices made about the level of detail and which data are quantitative or qualitative. A standardisation method is being developed for habitat condition assessments, with approaches set out for a large number of habitats for which Natural England provides condition criteria. The standardised method also provides a QGIS project that can be used with either of the two field apps.

The ESRI system. For ESRI users, the Field Maps app and the new Sweet app are available. Both provide users with the flexibility to create customised forms for field data capture. The ESRI system provides out-of-the-box solutions for cloud-based services and data storage, making it a seamless system that will appeal to those with larger teams or budgets. There are now a range of add-on products and services provided by ESRI partners, such as Temple Group's BNG field app and Ecospatial Solution's BNG data management service.^{12,13} For smaller ESRI-using teams, these add-ons provide additional capabilities without requiring a GIS team to manage them.

Whether using the open-source QGIS system or ESRI's proprietary solutions, there are mature and capable systems available for ecologists who want flexibility. While GIS systems allow for flexibility, some users prefer a well-designed ready-to-use system. To support these ecologists in carrying out habitat surveys and BNG assessments, there are a range of ready-made solutions. The official UKHab app by Coreo provides UKHab classifications and the ability to record data in the field that syncs back to a laptop via the cloud.¹⁴ The app and platform allow mapping of habitats at the desktop or field level and the recording of species at each survey point or for each parcel; they also provide a full UKHab guide on a single device. The UKHab app also enables the export of maps for reports and data for GIS, offering great user flexibility.

DATA STANDARDS

Any discussion of digital technologies, particularly those concerned with data collection and management, is incomplete without consideration of data standards. Standardising data plans is essential, particularly in



the ecology sector, as the range of systems, devices and tools used by all those across the planning process varies hugely. From the ecologist collecting data in the field, to the developer or planning consultant reviewing documents prior to submission, to planners and ecologists working in local planning authorities, statutory agencies and beyond, right back round to the ecologist carrying out monitoring, all these users are likely to have different systems for capturing and managing data. The need for standards to facilitate interoperability is clear.

Data standards for BNG have been produced. The Association of Local Environmental Records Centres created a BNG data standard, specifically for habitat data. This standard was also referenced in the creation of a Defra QGIS tool, which accompanies the Defra metric and which also has a data standard. Some local planning authorities have published data standards as part of their guidance on BNG, although much of this may have been superseded by the Defra QGIS tool standard. So standards do exist, but whether they have been adopted by all the tools and platforms mentioned here is unclear. It seems there will still be a job to do to transform data from one format to another.

One of the other complexities of BNG is that the Defra metric has not wholly adopted the UKHab classification system. There are significant differences between the habitats listed in the metric and how they are classified in UKHab. This means that, once again, there is a translation job to be done to work out which metric habitat type to use for some UKHab types. While there are good reasons for using different systems within the metric (e.g. for lakes or peatland habitats where more nuances are possible in the classification systems used), tools built to allow digital data capture and management must incorporate some form of translation. Again, a lack of standards here could result in differing interpretations of the same data.

Condition assessments are another area where there is a lack of a standard method and, as a result, condition assessments range from a tick-box exercise to the detailed collection of data for assessing condition. While efforts are being made to create a standard method, the value of this will only be realised if it is widely adopted across ecology practices.¹⁵ The benefit of objective repeatability will be crucial in monitoring the delivery of habitats both on- and off-site.

GAPS AND OPPORTUNITIES

As shown, there is an increasing array of digital tools designed to save time and improve the efficiency and accuracy of digital data capture and management. With the increased demands for ecological input and a recruitment and skills crisis within the sector, it is essential that ecologists make the best use of these tools in delivering advice and guidance for BNG and beyond. However, a considerable amount of time is still spent by ecologists on data collection and reporting tasks, which could be spent on the core skills of ecological survey and problem-solving.

So what additional tools or services might unlock further time-saving? One key component of BNG is the metric

itself. A crucial tool in understanding the impacts and benefits of development on biodiversity, it is nonetheless an anachronistic approach to creating what is essentially a software tool. The Excel spreadsheet is ubiquitous, and in theory universal, but in reality the current metric has become somewhat bloated with all the macros, formulas and sheets crammed into the spreadsheet. Essentially, a fully functioning application with a complex user interface has been built into an Excel spreadsheet – a format not best suited to the purpose.

The format of the metric also limits innovation and automation. Much of the logic, algorithms and decision-making is locked away and not openly published by Defra. A huge time saver would be the automatic population of the metric from GIS data, but the Excel format makes this incredibly difficult. The requirement to submit a metric spreadsheet with a planning application (which ironically most planning portals do not accept) also limits innovation in this area. Again, open standards for the metric and an acceptance of alternative formats for metric data would allow for the creation of a range of tools and services, many bolted on to the existing options above, to vastly reduce the time involved in preparing metrics. When the iteration that many development designs go through is factored in, the importance and value of liberating the metric from a spreadsheet are clear.

Reporting is an important but time-consuming part of ecological practice and where there are enormous opportunities for automation. Defra has provided some templates for biodiversity gain reports and habitat management and monitoring plans, but these are quite restrictive in terms of format and structure.¹⁶ They are useful in providing guidance as to the type of content required, but automation approaches are often hampered by strict file types, formatting and layout. The Chartered Institute of Ecology and Environmental Management published guidance on the format of BNG reports, setting out the types of information that should be provided without being prescriptive about the file type or format of a report.¹⁷ This type of guidance is what is required to ensure all the necessary information is presented, without format restrictions. Reporting automation could save considerable time for ecologists: Digital Ecology's work with automation saves about 50 per cent in terms of report-creation time compared to copy-paste operations from template documents.

Many of the habitats created as part of BNG delivery (especially everything created off-site) will require monitoring. A combination of all the approaches discussed (remote sensing, digital data capture, standards and automation) will be invaluable in collecting, analysing, assessing, and sharing data and information on the fate of these habitats. For BNG to be a successful policy, there needs to be real gains in species-rich habitats, and on- and off-site monitoring are essential. Digital tools and standards will be vital in demonstrating success.

Dr Dan Carpenter, CEnv, is an ecologist and environmental data scientist with extensive BNG experience in both local government and consultancy. He works at the interface of ecology and digitisation, helping ecologists make the best use of digital tools to deliver better outcomes for nature. He is Managing Director of Digital Ecology and Chief Ecologist of Map Impact.

REFERENCES

- Department for Environment, Food & Rural Affairs (2023) Statutory biodiversity metric and tools. https://www.gov.uk/ government/publications/statutory-biodiversity-metric-toolsand-guides (Accessed: 22 August 2024).
- 2. Natural England (no date) *Natural England open data geoportal.* https://naturalengland-defra.opendata.arcgis.com/ (Accessed: 22 August 2024).
- Natural England (2024) Living England habitat map (phase 4). https://www.data.gov.uk/dataset/e207e1b3-72e2-4b6a-8aec-0c7b8bb9998c/living-england-habitat-map-phase-4 (Accessed: 22 August 2024).
- UK Centre for Ecology and Hydrology (no date) UKCEH land cover maps. https://www.ceh.ac.uk/data/ukceh-land-covermaps (Accessed: 22 August 2024).
- UK Centre for Ecology and Hydrology (no date) UKCEH land cover maps. https://www.ceh.ac.uk/data/ukceh-land-covermaps (Accessed: 22 August 2024).
- Map Impact (no date) *BiodiversityView*. https://www.mapimpact. io/product/biodiversityview/ (Accessed: 22 August 2024).
- BNGAI (no date) Home page. https://www.bng.ai/ (Accessed: 22 August 2024).
- Gentian (no date) Habitat surveys made simple. https://www. gentian.io/services (Accessed: 22 August 2024).
- QField (no date) Home page. https://qfield.org/ (Accessed: 22 August 2024).
- Mergin Maps (no date) Home page. https://merginmaps.com/ (Accessed: 22 August 2024).
- QGIS (no date) Home page. https://qgis.org/ (Accessed: 22 August 2024).
- 12. EcoSpatial Solutions (no date) Home page. https://www. ecospatialsolutions.com/services (Accessed: 22 August 2024).
- Temple (no date) UKHab & BNG survey app for the ESRI community. https://storymaps.arcgis.com/stories/0e851751218a4 b3688fc48006538e9d3 (Accessed: 22 August 2024).
- 14. Coreo (no date) *The UKHab & BNG platform*. https://coreo.io/ ukhab/ (Accessed: 22 August 2024).
- Habitat Condition Assessment Method (no date) Home page. https:// conditionassessmentmethod.co.uk/ (Accessed: 22 August 2024).
- Natural England (2024) Habitat management and monitoring plan template (JP058). https://publications.naturalengland.org. uk/publication/5813530037846016 (Accessed: 22 August 2024).
- Chartered Institute of Ecology and Environmental Management (2021) *Biodiversity Net Gain Report and Audit Templates.* Winchester, CIEEM. https://cieem.net/wp-content/ uploads/2021/07/CIEEM-BNG-Report-and-Audit-templates2.pdf (Accessed: 22 August 2024).

CASE STUDY

Alscot Biodiversity Project: the UK's first private biodiversity net gain site

Emma Holman-West discusses how Alscot broke new ground with its approach to biodiversity.

s far as biodiversity net gain (BNG) is concerned, Alscot Estate has undoubtedly been a pioneer. The Alscot BNG site, the first private site in the UK and measuring around 47 acres, was launched in April 2020, under a BNG metric devised by Warwickshire County Council. The Alscot project was implemented following several years of research into environmental land management schemes, including woodland restoration and rewilding, before BNG came into the mainstream in 2016.¹ CASE STUDY



© Alscot Estate

LEADING THE WAY

In 2017, at Alscot we instructed environmental specialists to conduct baseline surveys, nature assessments, soil tests and flood surveys. We also carried out financial impact assessments. But one of the most difficult tasks – aside from convincing local farmers that implementing BNG was good practice for the future – was to find a lawyer who was knowledgeable in this emerging area and who could draft a BNG contract. Such a contract would allow developers to purchase BNG units from Alscot and would be legally binding to ensure that the biodiversity units were protected and maintained for the duration of the purchase agreement.

With almost 4,000 acres of estate land, including watercourses, arable and grazing land, and woodlands, we are continually embracing change while enabling food production and introducing alternative commercial and natural capital schemes. We have implemented a mix of sustainable opportunities and actions, including a forthcoming second, larger BNG site of around 150 acres that will allow connectivity to the existing site. In addition, September 2024 will see the start of new regenerative farming practices across Alscot farmland, which will be managed in-house. These integral systems demonstrate various benefits including biosecurity, clean air, flood mitigation, healthier food production and a sustainable farming business and livelihoods.

FORGING CONNECTIONS WITH STAKEHOLDERS

In the early stages of Alscot's involvement with BNG, the concept itself was new. As the first potential private BNG site in the country, our work led to forging many valuable connections. Engaging with the head of ecology at Warwickshire County Council was instrumental in bringing BNG policy forward, as the county was one of only a handful of local authorities trialling BNG prior to the national rollout. Through our connection to the county council's ecology team, we were introduced to other ecologists who were familiar with the principles of BNG. This network, including advisers and leaders from Defra, Natural England and local MPs, became invaluable to our project and decision-making, as we had forged ties with professionals with a genuine understanding of the concept and its implementation.

PRIORITY SPECIES AND HABITATS AT ALSCOT

To begin with, our focus was on trees, as we were exploring different options on how to work with the land (rewilding, for example, was also considered a potential avenue). As far as Alscot was concerned – through our understanding of the importance of carbon capture – the more trees we planted, the better.

In particular, there is a long-standing wish to restore the parkland next to the main house. Over the years, many of the parkland trees have been lost to wartime efforts, farming and disease. In 2015, a survey of the parkland was commissioned with the aim of establishing what had existed at Alscot in previous generations. When the completed parkland restoration survey was delivered, we wanted to consider its findings within a modern-day context and make sure that our restoration efforts were suitable for today's needs and uses.

Surprisingly, it transpired that a focus on and ambition for planting new trees and hedges would not work within the biodiversity offsetting management plan (BOMP) under the Warwickshire biodiversity metric that existed at the time: rather than carbon capture through trees, the Warwickshire metric placed more importance on establishing grass meadows. Regardless, with an emphasis on improving the landscape for the future and for environmental gain, we proceeded to plant various species of new trees into an area of the BNG land.

The agreed objective of our 47-acre project was to improve the land to create neutral grasslands and to enhance and improve the land in order to provide habitats for plant and animal species, including those that are rare and near-extinct. In just these few early years, there has been a visible increase in wildlife; early results show that birds (red kites, heron), bees, butterflies and plants (speedwell, lady's bedstraw, lesser trefoil, bristly oxtongue) are returning or growing in number.

CHALLENGES AND SUCCESSES TO DATE

Balancing the commercial reality of a diverse estate – the elements of which can conflict with each other and which relies on the estate's success in retaining (and creating) jobs and homes – can be challenging. At Alscot, it is about finding a balance: sustainable development and commerce must continue to enable the building of new homes and for the wider economy to thrive. Farming for food is essential for sustainability, health and well-being, and BNG is essential for the overall health of the environment and future of the planet.

In the early days of implementing BNG at Alscot, there were various risks and challenges. The greatest was finding a lawyer who understood BNG and who could prepare a brand-new type of contractual document. There was no readily available template, and the estate had to source a lawyer and invest substantially in the creation of this document. Furthermore, understanding the tax implications was a complicating factor. Alscot's engagement with Defra leaders and local MPs assisted in clarifying and defining many of the details required for establishing a successful BNG site.

The Covid-19 pandemic was another complication. The start of Alscot's plan coincided with lockdown and a lack of hands-on labour. In working to overcome this, we encountered many smaller obstacles: as an estate that did



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not farm any land in-house at the time, everything was tenanted out, and we needed to establish relationships with conservation farming contractors who had the necessary knowledge and equipment.

Environmental conditions such as a high volume of rain could also adversely impact the estate, but as the project develops, we become more resilient and find new ways to adapt.

LESSONS LEARNT

When devising a BOMP, challenging the ecologists is essential: landowners should not be afraid to get involved. A BOMP is formulated to follow a long-term process-led approach, and the goal should be designed with its achievement in mind. No one knows their land better than the landowner.

The Alscot project is monitored closely and is contractually binding with Warwickshire County Council, using the original council metric. To date we have met our objectives, in line with the BOMP, and we can see a visible difference in the soil structure and in the appearance and increase in plant and wildlife numbers. It is an absolute pleasure to see such a positive transformation and a stark reminder why we need to make these changes.

At the start of the project, we engaged an agent who was tasked with selling 60 biodiversity units. To date we have sold over 70 per cent of those units. The sale of BNG units has enabled further investment into management of the project as well as into other areas of the estate, which in turn generate further income. It is important to remember that sale of BNG units is received as a one-off payment and that the land management of a BNG site can be costly. The sites are subject to contract and will continue to be monitored and managed for the full term regardless of whether they have been purchased by a developer, so accounting for the ongoing site management costs must be factored in. The BNG unit purchase payments provide funds for Alscot to reinvest into other projects on the estate that will generate an income to cover these ongoing management costs.

The Alscot Biodiversity Project successfully engages and collaborates with local primary schools, ecological groups and charities, running activities such as Scouts Volunteering Week and Biodiversity Education Day. We are very proud of the relationships we have built and the progress we have made by opening up the site to environmental and educational studies through practical on-site activities.

Emma Holman-West is the ninth generation West to call Alscot Park home, which she shares with her husband and their three children. Through Emma's leadership and innovation, Alscot has adapted and changed to suit modern-day requirements in terms of business and environmental concerns, as well as those of the local community and surrounding area. Emma balances the commercial reality of a diverse estate, which includes property and land opportunities and woodland, with regenerative farming and BNG.



REFERENCES

 CIRIA, Chartered Institute of Ecology and Environmental Management, and the Institute of Environmental Management and Assessment (2016) *Biodiversity Net Gain: Good practice Principles for Development.* https://cieem.net/wp-content/ uploads/2019/02/Biodiversity-Net-Gain-Principles.pdf (Accessed: 27 August 2024).

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IES photography competition

The 2024 IES Photography Competition yielded some fascinating submissions, from IES members and beyond. Exploring this year's theme – 'Together' – the entries were reflective of the unique perspectives and insights offered by those working across the environmental science sector.

From photos of unlikely pairings, such as Guy Mercer's owl and woodpecker staring each other down on a perch, to unexpected takes on more familiar views, such as the family of sheep who seem to be disappearing into the clouds behind them (see the winning photograph by Kyle Le), the photographs entered into the competition this year were of remarkable quality and creativity. Judges were



particularly struck by the entrants' impeccable timing and ability to capture sweet moments between animal families and couples (see Daniel Clampin's 'Gannets Greeting').

The atmospheric nature of the winning photograph captured the judges' imaginations, with its depiction of a still moment of reflection shared by the viewer and the subjects, responding to the theme of 'Together' in a surprising way. Winner Kyle Le said of 'Sheep in Clouds': "While hiking on the Isle of Skye, I encountered this family of sheep. They noticed me from afar and we shared a quiet connection before I captured the scene. Afterward, they returned to grazing, and I continued my journey."























Mandatory biodiversity net gain six months on

Ellie Savage and **Ethny Childs** consider the challenges, opportunities and next steps for this ambitious policy.

Andatory biodiversity net gain (BNG) came into force in England on 12 February 2024 for major developments and on 2 April 2024 for small sites. It requires a 10 per cent increase in biodiversity post-development – although it is worth noting that some local planning authorities have set a higher minimum requirement – meaning that natural habitats are left in a better state than before development. Biodiversity is measured in units, which are calculated using the statutory biodiversity metric.¹

A joint project called 'Mandatory biodiversity net gain in practice' by the IES and Association of Local Government Ecologists (ALGE) sought to establish an initial understanding of how BNG was working on the ground.² The purpose of the project was to identify good practice that could be adopted by practitioners and common challenges that can be addressed by decision-makers.

The first part of the project was the distribution of an online survey, running between 1 and 26 August 2024. There were 142 responses, of which 89 per cent came from IES or ALGE members. Most respondents work in planning (23 per cent), ecology (19 per cent) and environmental consulting (19 per cent). The survey

CASE STUDY



Do you think mandatory BNG, under the current system, is going to contribute to better environmental outcomes?



How prepared were you for mandatory BNG?



▲ Figure 1. Survey responses. (Source: IES)

included questions on how well BNG was working in practice, a request to rate potential challenges and a discussion of possible solutions. The survey also asked respondents whether they were willing to participate in a short interview, which would form the second part of the project.

HOW IS THE POLICY WORKING IN PRACTICE?

Several closed questions asked participants about their general experience of BNG. Responses included the following (see **Figure 1**):

- Nearly 66 per cent thought BNG was working at a fair, good or excellent level in practice, with just over 33 per cent stating it was working quite poorly or very poorly.
- There was a range of opinions on whether BNG would lead to better environmental outcomes. Around 36 per cent said that it would make a fair contribution, a further 36 per cent a small or no contribution, and 28 per cent a significant or very significant contribution.
- Around 68 per cent of participants were fairly, well or very well prepared for BNG, with only 10 per cent stating that they were not at all prepared.

These results show highly mixed experiences and perspectives of BNG across the planning and environmental sectors. At the more extreme ends of opinion there is a clearer swing with a significant proportion (8.2 per cent) having a very negative view of BNG compared to 1.2 per cent who have a very positive view.

The survey also sought to understand how much of a challenge aspects of BNG were. All 12 aspects of the policy presented were rated as a significant or very significant challenge by over half the participants (see **Figure 2**).

Delivering BNG off-site (including through the biodiversity market), compliance and enforcement, and monitoring and evaluation were rated as key challenges, with over 80 per cent of participants ranking them as a significant or very significant. Delivering BNG on-site was rated as a significant or very significant challenge by 79 per cent of respondents.

MORE INFORMATION REQUIRED PRE-PLANNING

The survey results show confusion around how BNG interacts with the planning process. Before planning permission can be granted for a development, the applicant must provide certain BNG-related information, such as the pre-development biodiversity value of the site and details of any irreplaceable habitats.³

However, applicants do not need to provide a post-development biodiversity metric calculation or

information on how they will achieve the 10 per cent BNG gain – called the biodiversity gain plan – to secure planning permission. Indeed, the Biodiversity Gain (Town and Country Planning) Regulations 2024 state that the biodiversity gain plan should not be submitted until the day after planning permission is granted.⁴ It is, however, regarded as good practice to submit a draft biodiversity gain plan at the planning application stage.⁵ Once planning permission has been granted, a biodiversity gain plan must be submitted and approved by the local planning authority (LPA) before construction can commence (see **Figure 3**).

The survey results suggest that, in practice, there is a lack of clarity and inconsistent application of the biodiversity gain plan. Participants were asked whether, in their experience, the biodiversity gain plan had been produced before or after planning permission. Around 50 per cent thought it was produced before planning permission, 23 per cent after and 27 per cent were unsure. Some respondents added that it varied or that a draft gain plan was used initially and finalised following planning permission. However, there was a significant consensus on how the system should work, with 79 per cent saying they thought that the biodiversity gain plan should be produced for the planning application.

Several comments provided more detail on what biodiversity information should be produced at an earlier stage: one participant stated that 'planners [should] only determine applications after detailed ecology surveys, not just a preliminary ecological appraisal... [We should] ensure BNG plans are also agreed pre-planning'. Another respondent advocated for 'amend[ing] statutory guidance to insist on post-development calculations before determination', while another wrote that:

'The only questions in the gain plan that need answering after determination concern the confirmation of buying national credits and linking the off-site parcel of registered land to the consented planning application. These two questions could form part of a post-determination, specifically numbered discharge condition instead.'

One participant who thought that the biodiversity gain plan should be produced after planning permission qualified that the 'eight-week determination period is totally excessive. It should be agreed in principle before'.

Others argued that there is a wider problem with biodiversity and BNG not being integrated throughout the design and development process, leading developers to consider BNG as a problem to be resolved post-design through offsetting. Integrating environmental professionals into project design teams and using environmental impact assessment (EIA) as a tool to

CASE STUDY

How much of a challenge would you consider the following aspects of mandatory BNG to be?



▲ Figure 2. Survey responses showing the level of challenge presented by biodiversity net gain. (Source: IES)

support design has long been called for to support better environmental outcomes and alignment with the mitigation hierarchy.⁶ Exploring the interaction between the EIA process and delivering BNG could be a key part of increasing the impact of BNG measures and ensuring compliance.

ON- AND OFF-SITE BIODIVERSITY NET GAIN

Developers should always seek to achieve on-site gains first but can use a mixture of gains to achieve 10 per

cent BNG; statutory biodiversity credits should only be sought as a last resort. Only three applications for credits have been made in the first six months, which is significantly below expectations and points to serious delays within the BNG regime. Survey participants were asked to give their experiences of on-site gains, including what has and has not worked well.

A common theme was the concern that on-site BNG delivered poorer environmental benefits than off-site



BNG. One reason for this was that on-site gains are often in the hands of developers, who may not take the appropriate care to implement and monitor them. Previous research has also shown the significant risk of on-site gains falling into governance gaps.⁷ Governance gaps relate to instances where conditions are in place that expose the gains to a high risk of non-compliance. For this study, the factors that placed an on-site gain at such a risk included a lack of registration, higher exposure to humans and pets, potential tensions between human and ecological needs for the space and a lack of experience by property managers in managing for biodiversity.

There were comments regarding on-site gains being subject to loopholes, shortcuts or being gamed. Examples included the increase in small-scale self- or custom builds (which are exempt from BNG) and the use of



private gardens for BNG purposes (the outcomes of which cannot be guaranteed).⁸ Research by law firm BDP Pitmans suggests that these types of policy loopholes are a critical issue, and that abuse is widespread.

Survey respondents suggested that developers were also more likely to default to easy enhancements such as tree planting, which may not be appropriate for the site. One potential solution was additional guidance for relevant stakeholders on the main biodiversity enhancements, their benefits and how they suit certain landscapes. One survey respondent noted that it is 'challenging to get developers to understand that they must protect those areas and manage them for a long time', while another remarked that 'we have seen these schemes ending up coming back to specialist BNG operators, as the developer has not been equipped to undertake the habitat production'.



Another common issue with on-site gains was the higher prevalence of small or randomly situated pockets of gain sites instead of the larger, joined-up sites for nature favoured by the Lawton Principles.⁹ Suggestions to improve the quality of on-site gains included an on-site BNG register (similar to that for the off-site system) and the introduction of a mechanism to value ecological connectivity. Specifically, one respondent stated: 'I think off-site contributions to larger biodiversity projects with robust management controls should be promoted over small-scale habitat creation that may fail through poor enforcement'.

Several responses discussed the difficulty of realising on-site gains on small sites: '1- to 2-house developments with limited shared open space' are not comparable to 'large housing developments on farmland'. Most small sites therefore need off-site delivery, but the costs and requirements associated with this are high and these developments often have limited funds.

DELAYS IN THE OFF-SITE MARKET

Survey participants were also asked about their experiences with off-site BNG. Around 20 per cent had experience with units purchased on the biodiversity market and around 20 per cent had experience of off-site units on existing developer-owned land. Participants were also asked to give their experiences of off-site gains. The responses varied, with some experiencing serious problems with the market and others saying that it was working well. This suggests that the market may not be consistent across the country.

For those who had a negative view of the biodiversity market, the key issue was the pace at which LPAs were approving off-site units (i.e. approving habitat management plans and legal agreements). Habitat banks in particular are facing LPA approval delays.



This is causing knock-on delays for developers, with the number of approved off-site units not meeting demand. According to one respondent, 'At the moment we have over 120 off-site owners interested in providing credits, but there have been no buyers due to low activity in planning consents and applications'. One suggested solution for speeding up the process was the establishment of a central BNG habitat management plan assessment:

'The main issue seems to be securing legal agreements for off-site schemes, which is seriously holding up availability. However, there are plenty of units in the marketplace, so this will become less of an issue over time.'

However, many respondents saw off-site gains, where available, as an easier and higher-quality option than on-site gains, albeit with a higher price tag. For example, one respondent said that 'this seems to be the best option:

CASE STUDY

it's on a register, it's covered by legal agreements, it delivers larger ecologically connected areas'. Yet there were also concerns that not all off-site BNG unit providers were of high quality. One participant warned of a ""race to the bottom", with for-profit organisations trying to sell units as cheap[ly] as possible with the objective being profit rather than environmental outcomes', and arguing there was a need for better regulation. That said, there is also recognition that there are good providers. As one participant stated:

'The market has worked well when engaging with top ecology-based firms such as Environment Bank that are able to provide a fully funded and ecological[ly] certain BNG unit purchase so that it fully de-risks it for the developers and the LPAs.'

MONITORING AND ENFORCEMENT CAPACITY

As well as being rated as a significant or very significant challenge by almost all respondents, the importance



▲ Figure 3. Stages of the biodiversity net gain application process. (Source: IES)

of securing good monitoring and enforcement were brought up throughout the survey. As one person remarked: 'It is pointless landscaping, tree planting and pond making at sites if these are not maintained accordingly'. Many respondents were concerned that monitoring and enforcement will not take place. This risk was also identified in a recent report by the National Audit Office: LPAs only have a discretionary duty to undertake monitoring and enforcement.¹⁰

Participants were also specifically asked how they were preparing to monitor and enforce gains, what challenges they anticipated and what the potential solutions were. A common response theme was the lack of clarity over who was responsible for monitoring and enforcement and how they should be funded. Many of the survey participants were concerned about the lack of capacity within LPAs, with some suggesting there would need to be an increase in the number of planning, legal and ecology specialists to effectively monitor and enforce BNG:

'The two of us in the LPA ecology "department" are already spread thin with the workload; I am not sure how realistic the delivery of the monitoring and enforcement of all the implemented BNG plans will be. I am not sure how this would be resolved without more staff involved that could adequately assess it.'

Others suggested that existing staff could be trained to deliver simple ecological monitoring tasks – for example, using Local Environmental Record Centres. Some thought that funding should be made available for monitoring to be undertaken by external bodies. Several respondents mentioned the need for funding to be secured up front – for instance, through reflecting it in the price of BNG units. A few respondents mentioned the need for improvement of LPA databases to enhance monitoring and enforcement. One respondent suggested creating an open register or map of delivered credits, with the potential for local communities to play a role in monitoring local sites.

When discussing enforcement and penalties, there was a range of suggestions, with some advocating for stiffer penalties for non-compliance and for the setting up of a BNG watchdog to arbitrate and penalise, especially the 'unregulated habitats bank market'. Others suggested motivating developers to deliver ongoing habitat management – for example, through a grading scheme of company commitment to BNG.

More robust post-project monitoring is needed to support improved understanding of the effectiveness of interventions and the environmental impacts of developments. Making monitoring data openly accessible and interoperable will support better evidence to feed into EIAs and provide more effective mitigation and BNG measures.

CONCLUSION

Six months in, the survey results indicate that BNG is working well for most practitioners. Yet it also tells a more complicated and developing tale. Many respondents remarked that it was difficult to definitively answer questions at this early stage, and that future research may tell a different story. However, it was clear that there are some significant issues that should be addressed.

- More biodiversity gain information needs to be produced at the planning application stage;
- Some on-site BNG is at risk of not providing significant environmental benefits, and stricter regulation and guidance need to be provided;
- The off-site BNG market is facing serious delays with the need to speed up LPA approvals; and
- LPAs also need more capacity for monitoring and enforcement, which are critical if BNG is to achieve its aims.

The Government has committed to transforming the planning system to unlock development to build 1.5 million new homes and a generation of new towns. This wave of development will change the face of the country, and it must be done in a way that is right for nature. The Government has also recognised the dire funding problems facing local authorities, and addressing this will be at the heart of ensuring that BNG takes place in communities, not just on a spreadsheet.

As it stands, 33 per cent of survey participants think that BNG will make a small or no contribution to environmental outcomes. Improvements to practice are critical if BNG is going to play its part in unlocking the environmental improvement across the country that we urgently need to protect biodiversity, restore ecosystem health and meet our national and international commitments.

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FURTHER READING

- Wentworth, J. (2024) Biodiversity Net Gain. Parliamentary Office of Science and Technology, POSTnote 728. https://researchbriefings.files.parliament.uk/documents/ POST-PN-0728/POST-PN-0728.pdf (Accessed: 22 September 2024).
- Natural England (2024) BNG lessons learned with Local Planning Authorities. https://naturalengland.blog.gov. uk/2024/07/23/bng-lessons-learned-with-local-planningauthorities/ (Accessed: 12 September 2024).
- Green Finance Institute (2024) Biodiversity net gain: a roadmap for action. https://hive.greenfinanceinstitute. com/gfihive/insights/biodiversity-net-gain-a-roadmap-for-action/ (Accessed: 12 September 2024).

REFERENCES

- Department for Environment, Food & Rural Affairs (2023) Statutory biodiversity metric tools and guides. https://www. gov.uk/government/publications/statutory-biodiversitymetric-tools-and-guides (Accessed: 13 September 2024).
- Institution of Environmental Sciences (2024) New Biodiversity Net Gain in Practice project launched. https://www.the-ies. org/news/new-biodiversity-net-gain (Accessed: 13 September 2024).
- Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2024) *Biodiversity net gain*. https://www.gov.uk/guidance/ biodiversity-net-gain#para11 (Accessed: 11 September 2024).
- UK Statutory Instruments (2024) The Biodiversity Gain (Town and Country Planning) (Consequential Amendments) Regulations. https://www.legislation.gov.uk/ ukdsi/2024/9780348254419 (Accessed: 15 September 2024).
- Durkin, P. and Baker, J. (2024) Mandatory Biodiversity Net Gain in England: A Guide. Chartered Institute of Ecology and Environmental Management, Construction Industry Research and Information Association, and Institute of Environmental Management and Assessment. https://cieem.net/ wp-content/uploads/2024/06/BNG-Technical-Guide-2024-1. pdf (Accessed: 11 September 2024).
- Institution of Environmental Sciences (2023) Reframing EIA: a tool for better design for people and planet. https://www. the-ies.org/resources/reframing-eia-tool-better (Accessed: 11 September 2024).
- Rampling, E.E., zu Ermgassen, S.O.S.E., Hawkins, I. and Bull, J.W. (2023) Achieving biodiversity net gain by addressing governance gaps underpinning ecological compensation policies. *Conservation Biology*, 38 (2), e14198. https://doi. org/10.1111/cobi.14198 (Accessed: 13 September 2024).
- ENDS Report (2024) Government moves to close BNG 'loophole' as industry warns of wider risk of developer exploitation. https://www.endsreport.com/article/1886038/ government-moves-close-bng-loophole-industry-warnswider-risk-developer-exploitation (Accessed: 24 September 2024).
- Department for Environment, Food & Rural Affairs (2010) 'Making space for nature': a review of England's wildlife sites published today. https://www.gov.uk/government/news/ making-space-for-nature-a-review-of-englands-wildlife-sitespublished-today (Accessed: 22 September 2024).
- National Audit Office (2024) Implementing statutory biodiversity net gain. https://www.nao.org.uk/reports/ implementing-statutory-biodiversity-net-gain/ (Accessed: 9 September 2024).

Embedding marine net gain into offshore windfarms

Bruno Agochukwu explores key barriers to the development of marine-related biodiversity improvements.

Help umanity is at a critical juncture as we face the triple planetary crises of climate change, air pollution and biodiversity loss. To address these challenges, offshore windfarms have developed and expanded rapidly and, if delivered sustainably, can help us meet our global net-zero target by 2050.¹ Many countries are also embracing ambitious approaches to environmental impact reduction by implementing biodiversity net gain (BNG) and nature-positive and no-net-loss concepts. Such policies are now recognised in UK legislation, although they are generally only applicable to terrestrial activities.^{2,3}

121



MARINE NET GAIN AND OFFSHORE WIND

For the marine realm, there needs to be more consensus on how marine net gain can provide optimal environmental and societal outcomes from activities related to offshore windfarm construction, operation and decommissioning. Like the mandatory BNG policy, which applies to terrestrial and intertidal environments, the proposed UK marine net gain policy currently under development will require developers to leave marine biodiversity in a measurably better state than at the start of development.² There are a few key challenges and barriers to implementing such a policy, including around:

- Regulatory and policy barriers;
- Technical and scientific limitations;
- Economic and financial barriers;
- Rigid low-cost contract award criteria;
- Stakeholder concerns and social acceptance;
- Technological and engineering barriers; and
- Environmental impact and marine net gain compatibility with BNG.

Some offshore wind developers have floated a few ideas within their supply chains regarding trialling nature-inclusive designs to achieve marine net gain. In this context, nature-inclusive design solutions include a range of eco-engineering approaches that promote active improvement of ecosystems and biodiversity in the marine environment and may specifically refer to alternative engineering designs that create favourable habitats for marine species, in addition to serving their primary engineering function. Notable examples include:

Cod (or fish) hotel. This is an add-on option that can be attached to a wind turbine's main structure and be deployed as it is placed on the seabed. It consists of three main parts: (i) the saddle, which connects the frame of the cod hotel to the jacket structure; (ii) the steel frame, which forms the structural casing; and (iii) the ecological unit, which consists of a steel gabion basket filled with perforated steel tubes and monitoring funnels. The steel structure of the fish hotel (frame, saddles and double plates) is coated with specialised materials such as metalised spray and epoxy-based coatings to protect it from the harsh marine environment, similar to the jacket structure. The ecological benefits of this nature-inclusive design are to accommodate primarily Atlantic cod by providing shelter and foraging areas. The design can be adapted for a range of other fish species.⁴

Adapted rock protection measures. This involves optimisation of the scour protection layer through the deployment of natural substrates (i.e. boulders and gravel) either as scour protection or in addition to it. Their main function is to provide a hard substratum that will enhance the overall diversity of species settling around the offshore wind turbine. In utilising both large and small natural rocks and stones, they provide an array of habitats that may facilitate a range of species, including larger sharks and rays and smaller habitat-associated reef fish and invertebrates.³

Reef-type structures and concrete blocks. These are concrete units used as scour protection or to establish



stand-alone reefs. Exo Engineering has developed the truncated cuboctahedron ExoReef, or ExoHedron for short.⁵ The ExoHedron incorporates a unique surface texture design that facilitates bio-colonisation. It also provides shelter for juvenile fish and crustaceans in the form of swim-through tunnels, helping them to avoid predation and for breeding. Colonisation of algae over the customisable surface textures generates food sources for species in the surrounding area.

Mattresses. These are designed to be used as an alternative to articulated concrete mattresses and are placed on top of cable routes to deliver effective scour protection. One example is the ExoMatt, whose unique surface texture design encourages sessile (e.g. barnacles) and other mobile organism bio-colonisation.⁵

Water replenishment holes. Monopile foundations on Vattenfall's 1.5 GW Hollandse Kust Zuid windfarm, the world's first subsidy-free offshore windfarm, are furnished with several water replenishment holes. All 140 of the turbine monopile foundations are manufactured with elliptical openings, located above the seabed and just below the water surface, measuring approximately 30 cm by 1 m. These openings ensure that the water in the foundation flows well and is refreshed. They also allow fish and other sea life such as anemones, crabs and shrimps to enter the turbine foundations and to potentially use them as shelter or to find food.⁶

REGULATORY AND POLICY BARRIERS

Globally, environmental regulations and policies are the most extensively used tools to address environmental issues, including for marine biodiversity management. However, inconsistent regulations and policies between and within countries, often with competing objectives regarding marine net gain and conservation, make it challenging to implement a uniform approach.

For example, there are no fishing restrictions in many of the UK's Marine Protected Areas (MPAs). This means that damaging activities such as bottom trawling (dragging weighted nets across the seabed) or dredging (using heavy-duty metal-framed nets) of sensitive seabed habitats are still allowed. This policy may discourage offshore wind developers from rewilding such areas where sensitive marine ecosystems are (legally) being subjected to such damaging activities. Also, it is unclear whether regulators would support a wide range of rewilding projects in MPAs, which are primarily designated to protect specific habitats or species (also known as features).

Specifically, MPAs usually adopt a controlled approach, which might affect certain natural processes that rewilding may seek to restore. For example, fishing restrictions in MPAs may not be in harmony with rewilding objectives that seek to encourage a dynamic predator-prey relationship to re-establish naturally. Rewilding could also be seen as counterproductive to the specific conservation goals of an MPA that is designed to protect, say, a particular seagrass bed if it encourages the migration of species that threaten the protected habitat.

The UK Environment Act 2021 introduced BNG, and its implementation is enabled through amendments to the Town and Country Planning Act 1990 and the Planning Act 2008 (in relation to Nationally Significant Infrastructure Projects). Any development on land and in intertidal locations will be required to deliver a mandatory BNG. Defra proposed that marine net gain should adopt the same approach in introducing a mandatory requirement covering nearly all new marine developments in English waters. However, development control and regulation in the marine environment can involve a number of different licensing and consenting regimes.⁷

Therefore, the need for an efficient consenting process for marine net gain initiatives cannot be over-emphasised.

If the consenting process is lengthy, expensive or uncertain, it will create an unintentional barrier to embedding marine net gain initiatives in the offshore wind industry. Governments and their partners will need to develop consistent regulations and policies that provide clear and concise guidance to developers on the consenting process for marine net gain projects. In turn, developers are likely to implement such initiatives if they can gain consent in a reasonable amount of time and avoid legal challenges.

TECHNICAL AND SCIENTIFIC LIMITATIONS

Terrestrial BNG measurement relies on a metric to calculate the biodiversity value of habitats attributable to a development in the form of habitats lost, degraded, added or improved through the development.⁸ Several difficulties arise when applying this approach and the net gain concept to the marine environment, such as the need for comprehensive baseline data on the condition of existing habitats. This makes it difficult to assess the impacts of offshore wind developments and the effectiveness of restoration strategies on mobile species, whose response to offshore wind developments may not be captured by habitat impacts alone.

Construction and operation activities can disrupt and impact marine habitats and species, making it challenging to measure and achieve a net positive impact on marine biodiversity. For example, pile driving can cause physical injury, displacement and behavioural effects in marine mammals. Anchor drag can cause seabed disturbance, while the movement of vessels can result in physical injury and mortality to sea life from propellers and ship strike.

Therefore, developing a robust and reliable marine version of Natural England's BNG metric is important to enable a smooth transition into marine net gain policy. Although the development of a metric is still in the early stages, the involvement of offshore wind developers and stakeholders will improve their familiarity and understanding of calculating marine net gain.⁷

ECONOMIC AND FINANCIAL CONSTRAINTS

The high costs associated with implementing marine net gain initiatives relative to terrestrial BNG is another factor against the adoption of such a policy by the offshore wind industry. Factors that account for cost differences include:

- Marine surveying and monitoring costs, which require specialised equipment, remotely operated vehicles, sonar and remote sensing technology.
- The more challenging nature of the collection of baseline and monitoring data in the marine environment due to water clarity, depth and wave activity can add to the cost of implementing marine net gain.







• The remoteness of offshore locations, requiring personnel, materials and equipment transfer by boat or helicopter, leading to a substantial cost increase compared to terrestrial BNG implementation.

Another constraint is the difficulty associated with quantifying the benefits of achieving marine net gain against its long-term costs. This makes it difficult for offshore wind developers to justify the significant initial investment.

Detailed costs for several nature-inclusive design options based on a reference windfarm comprising 60 monopiles (i.e. no floating structures) were developed in close collaboration with stakeholders for the North Sea (predominantly from the Netherlands). While these will have increased since publication, they offer a relatively unbiased example of deployment costs.9 This cost estimate includes onshore and offshore activities, direct (material) and indirect (site organisation, mobilisation, facilities, risk) costs, contingency provision, construction, engineering design, permits and insurance, with costs of decommissioning also included. Facilities costs include office accommodation and other logistics, such as the heavy machinery and specialised equipment required to support the deployment of the selected nature-inclusive design option during windfarm construction (design) and operational monitoring phases.

Every nature-inclusive design option comes with ecological and technical risks that need to be considered across the full life cycle of the windfarm. Ecological risks include the lack of ecological success, settlement of invasive non-native species or diseases, competition between target species, and absence of target species. Technical risks include the displacement or structural failure of the selected nature-inclusive design, biofouling, incorrect deployment and unforeseen costs associated with uncertainties (e.g. current and future rules and regulations delays for each project phase). The total life-cycle costs are also provided in the report, which comprise the initial investment and the costs across a 25-year cycle (see **Table 1**). Capital expenditure includes: (i) the costs per monopile or single structure in which the nature-inclusive design will be deployed (based on a total of 60 wind turbines); and (ii) two nature-inclusive design options for scour protection around the structure (not including the scour layer and fish hotel).⁴

With marine net gain policy still in the early stages of development, financial incentives will go a long way towards encouraging its stewardship by offshore wind developers. Other incentives, such as an efficient permitting process for marine net gain initiatives, will also save time and money, thereby promoting the implementation of such measures.

RIGID LOW-COST CONTRACT AWARD CRITERIA

The consensus within the industry is that the real block to marine net gain implementation is the rigid lowest cost, technically compliant award criteria most offshore wind developers adopt. Although there is a Table 1: Summary of life-cycle costs for different nature-inclusive design options based on 60 wind turbine monopiles with two nature-inclusive design options per monopile (a total of 120 structures) not including a fish hotel; scour protection layer options are based on a protection area of 20 per cent per 30 m².

	Onshore	Offshore	Deco
Add-on			
Biohut®	£2,319	£0	
Cotel	£2,089	£0	
Optimized sco	our protection layer, o	ptimised cable p	rotecti
Protection added during design	£0	£0	
Protection added during turbine placement	£0	£4,458	
Protection added after following turbine placement	£0	£0	
Placing unit or	n or in scour protectio	n layer	
Habitat pipes	£1,393	£418	
Reefball® and Layer cakes	£1,393	£1,393	
Reefball® and 1m³/pcs	£307	£1,393	

nissioning	Engineering and permitting	Total costs per monopile (25 years)			
£254	£582	£3,156			
£140	£504	£2,733			
£0	£0	£0			
£8,916	£3,025	£16,398			
£0	£0	£0			
£1,170	£674	£3,655			
£1,810	£1,039	£5,637			
£1,810	£794	£4,304			

commitment to introduce sustainability initiatives such as nature-inclusive design to achieve marine net gain into award criteria, there are no signs from purchasing teams that this is imminent. This is due to the associated high costs and the absence of financial incentives for implementing marine net gain initiatives. Without changes to award criteria, the only real opportunity is to specify marine net gain initiatives in tender documents. This approach assumes offshore wind developers know best and may stifle innovation and do little to incentivise real change in the supply chain.

STAKEHOLDER ENGAGEMENT AND ACCEPTANCE

Stakeholders involved in offshore wind development - developers, regulators, conservationists and local communities - all have different views and interests regarding their priorities and approaches to achieving marine net gain. This may lead to conflict that is difficult to manage or resolve.¹⁰ For example, offshore wind developers may wish to include the artificial reef effects of offshore winds on protected cables or other marine substructures as positive incidental impacts in their marine net gain assessments. Conservationists may disagree and wish for this to be scoped out, as the understanding of artificial reef effects is relatively immature. Similarly, the presence of artificial reefs and associated species including fish, invertebrates and algae on certain types of marine infrastructure may lead to restrictions on, or exclusion of, other uses such

as fishing. Such protection measures could result in conflict between conservationists and fishers.

TECHNOLOGICAL AND ENGINEERING BARRIERS

As marine net gain is still developing, solutions are still emerging. Therefore, the existing infrastructure for offshore windfarms may not be designed to support additional measures for marine net gain and could require significant modifications and upgrades. For example, current offshore wind turbine foundations do not include design elements that could support marine biodiversity, such as surfaces that encourage marine organisms to settle or features that create shelters for fish and invertebrates. Engineers focus on standardised, cost-effective designs such as monopile foundations that do not inherently support ecological considerations. Offshore wind engineering designs have not yet widely adopted nature-inclusive designs that combine energy production with habitat enhancement and restoration.

Retrofitting existing infrastructure to include marine net gain initiatives can be technically challenging from a structural engineering perspective: the additional load, structural modifications and maintenance requirements may not align with engineering codes and standards. Lastly, there is no existing installation technology for turbines and associated infrastructure (e.g. cables and substations) that avoids significant seabed disturbance. Seabed preparation, drilling and piling can negatively



impact benthic habitats and species, leading to habitat loss or degradation, which in turn defeats the purpose of marine net gain objectives.

TERRESTRIAL AND MARINE IMPACTS

Many offshore wind developments ultimately land on the shore and, therefore, also comprise terrestrial and intertidal elements. Planning, consenting and licensing regimes and their respective net gain policies may overlap in certain circumstances. There is a need to ensure that marine net gain is as coherent and consistent with terrestrial BNG as possible, minimising the burden on developers. Furthermore, assessing and monitoring the cumulative impacts of multiple offshore wind projects on the marine and onshore environments is complex and requires comprehensive and coordinated efforts.

CONCLUSION

Regulatory and policy barriers, technical and scientific limitations, economic and financial obstacles, rigid low-cost contract award criteria, stakeholder concerns and social acceptance, environmental impact and marine net gain compatibility with BNG are all significant barriers to establishing a marine net gain policy. Addressing these barriers requires a coordinated effort between governments, industry, scientists and other stakeholders to develop clear policies, invest in research and innovation, and ensure effective stakeholder engagement and collaboration.

Moving forward, the key priorities for implementing marine net gain in the offshore wind industry are to ensure that development avoids detrimental impacts to the marine environment while simultaneously positively enhancing its health and ability to bounce back. Actions such as the avoidance of sensitive habitats during site selection by using detailed environmental impact assessments, the adoption of nature-inclusive design solutions such as artificial reefs to provide new habitats for marine organisms, and committing to post-construction seabed and reef restoration are key. Other priorities include the protection of migratory routes, mitigation of underwater noise, minimisation of pollution and disturbance, ongoing environmental monitoring, and stakeholder engagement and community involvement. ES

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REFERENCES

- United Nations Climate Change (2022) What is the triple planetary crisis? https://unfccc.int/news/what-is-the-tripleplanetary-crisis. (Accessed: 15 September 2024).
- Department for Environment, Food & Rural Affairs (2023) Understanding biodiversity net gain. https://www.gov.uk/ guidance/understanding-biodiversity-net-gain (Accessed: 3 September 2024).
- Plymouth Marine Laboratory (2024) Protecting the ocean through marine net gain. https://www.pml.ac.uk/news/ Protecting-the-ocean-through-marine-net-gain (Accessed: 3 September 2024).
- Blue Marine Foundation (2023) Opportunities for Nature Recovery Within UK Offshore Wind Farms. Final Report GB3003, prepared by MRAG. https://www.bluemarinefoundation.com/ wp-content/uploads/2024/01/Opportunities-for-naturerecovery-within-UK-offshore-wind-farms_Final-Report-2.pdf (Accessed: 3 September 2024).
- Exo Engineering (no date) Collaborations. https://www. exo-engineering.co.uk/collaborations (Accessed: 3 September 2024).
- Durakovic, A. (2022) Wind turbines offshore Netherlands open to sea life. https://www.offshorewind.biz/2022/04/04/windturbines-offshore-netherlands-open-to-sea-life/ (Accessed: 3 September 2024).
- Department for Environment, Food & Rural Affairs (2022). Marine Net Gain. Consultation on the Principles of Marine Net Gain. https://consult.defra.gov.uk/defra-net-gain-consultationteam/consultation-on-the-principles-of-marine-net-gain/ supporting_documents/Consultation on the Principles of Marine Net Gain.pdf (Accessed: 3 September 2024).
- Gould, A. and Brady, T. (no date) Marine net gain research and evidence project (Marine Futures Internship Programme 2022). https://www.marinedataexchange.co.uk/content/ evidenceProject/Marine%20Net%20Gain%20Research%20 and%20Evidence%20Project (Accessed: 3 September 2024).
- Hermans, A., Bos, O.G. and Prusina, I. (2020) Nature-Inclusive Design: A Catalogue for Offshore Wind Infrastructure. Technical Report commissioned by the Ministry of Agriculture, Nature and Food Quality, Reference 114266/20-009.700. https://tethys.pnnl. gov/sites/default/files/publications/Nature_inclusive_design_ catalogue_offshore_wind.pdf (Accessed: 3 September 2024).
- Edwards-Jones, A., Watson, S.C.L., Szostek, C.L. and Beaumont, N. J. (2024). Stakeholder insights into embedding marine net gain for offshore wind farm planning and delivery. *Environmental Challenges*, 14 (100814). https://doi.org/10.1016/j.envc.2023.100814 (Accessed: 3 September 2024).

Biodiversity, offsetting and net gain in Australia

Alan Key and Thomas Key share the lessons learnt from the country's long-standing policy.

The worldwide decline in biodiversity has been well documented, and the profound long-term effects, not just on ecosystems and species but also on human well-being, are broadly acknowledged.¹ As a result, and in keeping with the United Nations Sustainable Development Goals, many governments around the world have begun implementing legislation intended to reverse this decline while still allowing development and investment in conventional and emerging industries. The mitigation hierarchy is a key component of the legislative framework of many nations;² this integration of nature into decision-making is now required by many financial and investment organisations.³

In the Australian context, projects must demonstrate application of the mitigation hierarchy.⁴ Once all reasonable attempts to avoid and mitigate impacts have been built into the project design, the main tool to address any remaining impacts is to use offsets to replace the affected environment. Biodiversity offsets have been in use in Australia since the middle of the first decade of the 2000s. Given the length of time they have been in use, these offsets, programmes and legislative frameworks have recently been reviewed for their effectiveness.



CASE STUDY



Recent reviews and audits report that the current state of biodiversity offsets, and their implementation when used as mitigation for development-related impacts, is poor.⁵ The Australian Department of Climate Change, Energy, the Environment and Water recently undertook an audit of offsets that are required as part of development approvals. Of the 101 offsets audited, it was found that up to 62 were non-compliant. The reasons for non-compliance range from not meeting reporting requirements through to no registered offset being in place at all.⁶

However, after nearly 20 years there have also been many successful offsets, and even some that, despite adverse seasonal conditions, have maintained or improved ecological condition. This success depends on a multitude of factors, beyond the environmental, which include the commercial and legal arrangements, and the skills of those implementing the offset.

LEGAL CONTEXT AND FIELD ASSESSMENTS

Legislated offsets in all Australian jurisdictions require some level of ecological similarity between the offset and impact sites.⁷ The purpose of this requirement is to ensure that the overall balance of environmental values is considered and assessed for development projects and that, over time, the quantity and quality of the natural environment increases.^{78,9}

In selecting an offset site, developers must consider the potential of the area to regenerate and the difficulties in achieving the desired outcomes (i.e. the costs involved, the resources required and the accompanying risks). Success is quantified by using a standardised ecological assessment methodology. It is critical to maintain the same methodology throughout the offset's life to ensure consistency in measuring and reporting for ongoing compliance and progressive target and completion outcomes.

An example of a standardised methodology is that developed by the Queensland Herbarium (a Queensland Government institution) for assessing vegetation and habitat quality. This is a process guide that uses multiple factors ranging from organic litter and grass coverage to the number of large trees and specific attributes for fauna (e.g. large hollows in trees) among the various layers of the vegetation structure to calculate a score out of 8.¹⁰ An additional two points are scored for landscape-scale attributes such as contiguous vegetation and its connectivity to other native flora species.

Within this framework, the highest-scoring element is the percentage of non-native vegetation (including introduced pasture species) within the offset site, with more than 10 per cent of ground cover resulting in a score of zero and less than 5 per cent scoring a 10. These exotic pasture species are very difficult and costly to remove from offset areas, and without landscape- and community-scale eradication, must be monitored and treated for the life of the offset.

While the removal of invasive flora and fauna is key to an overall healthy and self-sustaining natural environment, it is not possible to achieve 100 per cent eradication. Instead, offsets should seek to target manageable uplift in multiple attributes under the assessment methodology. Manageable increases in individual attributes are more realistically achievable and can be targeted to the requirements of individual fauna species. For example, the southern and central greater glider (*Petauroides volans*) is an arboreal mammal that requires hollows in older trees for refuge purposes; this attribute is deliberately included when providing offsets for this species.

Improvements in individual attributes are measurable under the Queensland assessment methodology; they could include an uplift in the diversity of flora species, in the number of large trees and of the understorey percentage cover.

FINANCIAL AND COMMERCIAL STRUCTURING

Arguably the most misunderstood – and often the least considered – phase of the biodiversity offset life cycle is the commercial phase. This occurs in the period prior to any actions taking place on the ground, often before any formal ecological validation of the site. This is when the offset supplier and the developer requiring the offset negotiate the costs, legal structure, management requirements, and monitoring and reporting necessary for success.

Monitoring and reporting can be likened to regular audits of the ecological condition of the offset site and are required. In Australia, every five years is deemed appropriate to measure ecological condition change to track the success, or not, of the offset over its life-cycle term. This approach means that management can be adapted if required, so that apart from force majeure events the offset area condition is improving and on track to being successful.

The obligations of the various parties, and the methods and costs associated with achieving a successful offset, are not, and should not be, standardised. Therefore, communicating and building an understanding of each party's obligations, site-specific management requirements and associated costs are crucial during commercial negotiations.

These facilitated negotiations most often occur privately, with an experienced adviser such as Earthtrade. The adviser must understand the legislative obligations on both the developer and offset supplier, as well as the site-specific management required for a successful offset.



Each offset site must be considered individually, from a commercial perspective and for its capacity for ecological improvement and sustainability. Attempting to apply a standardised price to both the acquisition and management of an offset site increases commercial risk and, subsequently, implementation risk, which can jeopardise success.

BINDING THE OFFSET TO A PROPERTY

When a biodiversity offset project begins, it must be secured to the title deed of the property on which it is located. This is usually achieved by attaching a covenant to the title deed, together with an accompanying management plan. By binding the legal obligation of the offset to the property, the property owner is legally required to manage the offset area as per the covenant and associated management plan. This mechanism ensures that the offset is recognised as an encumbrance on the property. The offset is therefore secured to the ownership deed, which ensures that even if the property is sold, incoming landowners are required to continue implementing the offset until it has achieved its completion criteria.

There are various other considerations when bringing forward an offset site.

Enforcing compliance. There are several ways that this legally binding mechanism is enforceable. If during regular ecological condition audits, which are reported to the regulator, it is found that the offset is not improving or its condition is declining, then the regulator can pursue either the developer or the offset provider. (Who can be pursued depends on the jurisdiction and the regulatory offset framework.) There is also scope for the developer to pursue the offset provider for breach of contract, as the service of managing and improving the offset has been paid for by the developer. In well-structured contractual documents, there are also 'step-in rights' for the developer to gain access and to engage a third-party to manage the offset site if the landholder is not complying with the management plan.

Offset fee. Binding the offset site to the property title can greatly reduce the commerciality of the land, both in terms of agricultural production as well as other development potential. When this occurs, the value of the land and its marketability are reduced, which informs the first part of the fee to be paid to the offset supplier. This component is known as the offset fee. Naturally, as all asset holders will seek to gain an uplift in value, the offset fee is usually several

basis points over the market value of the portion of the land being utilised. The offset fee often also includes funds for necessary immediate infrastructure improvements such as fencing, firebreaks and access tracks. Alternatively, these elements can be separated out into an infrastructure fee. In the Australian context, the offset fee is generally paid up front and in full to the landholder, as the impact to land value and the cost of installing any infrastructure are immediate when the offset is secured to the title deed.

Involvement of financial institutions. If a financial institution is involved (i.e. holds a mortgage over the property), then its consent for the offset will be required. Often, to mitigate its risk from the potential reduction in property value resulting from the offset placement, the financial institution will require a reduction in the level of debt associated with the mortgage, generally proportional to the loan-to-value ratio (LVR) of the offset area. For example, if the property has a value of AU\$5 million, the offset area is to take up 50 per cent of the property, and the mortgage requires that the LVR is <50 per cent, the financial institution may require up to AU\$2.5 million to be paid to reduce the mortgage debt to within its lending requirements.

Tax breaks. This further reduction in land value due to the utilisation of the property for offsets and conservation is recognised and supported by tax legislation in Australia.¹¹ This means that landholders providing offset areas to developers can claim a tax deduction equal to the reduced value of the property.

Offset management fee. Costs for the ongoing implementation of management actions over the offset area are defined as the offset management fee. This is calculated on the cost of undertaking the activities involved in managing the offset area, as per the approved offset management plan, for a stipulated timeframe. The offset management fee includes funds to enable the management of non-native flora and fauna, fence and firebreak maintenance, controlled burns where appropriate, as well as more intensive actions such as planting of tubestock (tree seedlings that are large enough to establish in the offset area). While the quantum of the offset management fee can be substantial, due to the extended management timeframe it is best practice to financially model this fee for the entire term of the offset as part of the development project's due diligence. It is this offset management fee that is individualised to each property and offset area, as managing each site must be considered on its own merits and consider the specific site requirements.



The structure and arrangements for payment of the offset management fee should be appropriate for the risk level of each transaction. Considerations may include the credit standing of the developer, the type of project being developed and the long-term implementation risk associated with the offset supplier. Developments requiring longer-term management and implementation (e.g. wind farms or extractive industries) could consider annualised offset management fee structures. These types of projects are regarded as lower risk; this structure offers better capital management and allows flexibility to adjust payments based on factors such as inflation or force majeure events. For projects where the developer ownership timeline is much shorter (e.g. a housing development) payment terms should be similarly shorter with suitable legal, financial and governance structures that ensure funds are both expended appropriately and held externally to the development.

REGULATORY ENGAGEMENT AND FUTURE POLICY

Legislative offsets are a compliance mechanism linking the long-term improvement of the environment to development and investment. This should mean that economic development will contribute to environmental recovery in the long run. However, it also means that project developers have additional matters to consider during the project's approval and financial due diligence stages. The cost of biodiversity offsets needs to be considered at the start of the project.

Compared to other regulatory bodies interested in site safety, construction standards and infrastructure synergies, the regulatory frameworks for offsets target minimising the development's impact and the project's commitment to improving biodiversity. This focus on biodiversity is not the core mandate or skill of development companies and, as such, early and proactive engagement with proficient advisers and the regulator is key to successfully attaining timely development approval. This early engagement can be as simple as informally notifying regulators of the project, plan and intentions prior to submission of development documentation for approval.

As environmental condition improves in step with economic development, biodiversity offset frameworks will also evolve. A fundamental foundation for future policy development will be the use of a standardised ecological condition measurement system. The measurement of improvement in biodiversity offsets is highly detailed. Ecological condition scores are assessed prior to securing the offset, and estimates of post-offset quality scoring are used to calculate the total improvement expected – which in turn informs the offset ratio. This requires a pragmatic approach in assessing what is a realistic ecological improvement within a reasonable timeframe. Committing to an overly ambitious improvement to reduce the offset ratio vastly increases the risk of non-compliance with the offset management plan.

Further policy adaptation may be required based on the potentially unintended commercial implications of securing the offsets. As mentioned, a first step has been taken by the Australian Taxation Office, which has recognised the potential for negative impact of conservation agreements (including offsets) on property value and which has taken steps to reduce the associated tax burden. Creating this tax deductibility has led to offsets being considered a business opportunity. This means more parties, both corporate and small-scale family-owned farms, considering biodiversity offsets as a potential business pathway, thereby increasing supply to the market.

Biodiversity offset frameworks in Australia were initially designed to ensure that there was no net loss of ecosystems. This has now evolved to require a net positive outcome. There have been implementation and compliance failures; however, these risks can be mitigated through a pragmatic application of appropriate legal and financial structures to biodiversity offset arrangements into the future.

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About Earthtrade

Founded in 2007, Earthtrade is one of Australia's first biodiversity offset advisory firms. Providing a full suite of advisory, commercial negotiation and offset implementation services, Earthtrade has successfully negotiated, secured, implemented and monitored offsets on over 40,000 hectares of Australian native vegetation and manages substantial areas for protected vegetation and species habitat. With a focus on commercial, legislative and ecological pragmatism, Earthtrade identifies, secures, owns and implements biodiversity offsets that drive both environmental and economic benefits for an extensive client list.

REFERENCES

- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (2019) Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E.S. Brondízio, H.T. et al. (eds.). Bonn, Germany: IPBES Secretariat. https://doi.org/10.5281/zenodo.3553579 (Accessed: 13 September 2024).
- Biodiversity Consultancy (no date) Mitigation hierarchy: net positive and the mitigation hierarchy. https://www. thebiodiversityconsultancy.com/our-work/our-expertise/ strategy/mitigation-hierarchy/ (Accessed: 13 September 2024).
- Taskforce on Nature-related Financial Disclosures (no date) *About us.* https://tnfd.global/about/#mission (Accessed: 13 September 2024).
- Department of Climate Change, Energy, the Environment and Water (no date) Offsets mitigation hierarchy. https:// www.dcceew.gov.au/environment/epbc/approvals/offsets/ guidance/mitigation-hierarchy (Accessed: 13 September 2024).
- Samuel, G. AC. (2020) Independent Review of the EPBC Act Final Report. Canberra, Australia: Department of Agriculture, Water and the Environment. https://www.dcceew.gov.au/ sites/default/files/documents/epbc-act-review-final-reportoctober-2020.pdf (Accessed: 13 September 2024).
- Department of Climate Change, Energy, the Environment and Water (2024) Environmental Offsets Audit. Canberra, Australia: Department of Climate Change, Energy, the Environment and Water. https://www.dcceew.gov.au/sites/default/ files/documents/environmental-offsets-audit-report.pdf (Accessed: 13 September 2024).
- Department of Climate Change, Energy, the Environment and Water (2023) Offsets assessment guide. https://www.dcceew. gov.au/environment/epbc/approvals/offsets/guidance/ offsets-assessment-guide (Accessed: 13 September 2024).
- Department for Environment, Food & Rural Affairs (2021) Calculate biodiversity value with the statutory biodiversity metric. https://www.gov.uk/guidance/biodiversity-metric-calculate-the-biodiversity-net-gain-of-a-project-or-development (Accessed: 13 September 2024).
- The Biodiversity Consultancy (2016) Government Policies on Biodiversity Offsets. Briefing note. https://www.thebiodiversityconsultancy.com/fileadmin/uploads/tbc/Documents/ Resources/Government-policy-2.pdf (Accessed: 13 September 2024).
- Queensland Government (2020) Guide to Determining Terrestrial Habitat Quality: Methods for Assessing Habitat Quality under the Queensland Environmental Offsets Policy. Version 1.3. Prepared by Offsets Policy, Conservation Policy and Planning, Department of Environment and Science https://environment.des.qld.gov.au/__data/assets/ pdf_file/0017/102833/habitat-quality-assessment-guide-v1-3. pdf (Accessed: 13 September 2024).
- Australian Taxation Office (2023) Conservation covenant tax concessions.https://www.ato.gov.au/businesses-and-organisations/not-for-profit-organisations/gifts-and-fundraising/ in-detail/fundraising/claiming-conservation-covenantconcessions (Accessed: 13 September 2024).

Vital green infrastructure for a thriving economy: biodiversity net gain and the law

Alexa Culver examines the legal context behind the policy in England.



ANALYSIS

B iodiversity net gain (BNG) emerged from the Environment Act 2021 as response to the dramatic and continued decline in species abundance across England. Despite the collective efforts of governments, charities and local planning authorities (LPAs) over decades, England has become, and continues to be, one of the most nature-depleted countries on Earth.¹ By making nature economically visible, BNG means that habitats are no longer silently lost through harmful development activities. The policy ensures habitats within a proposed development site are valued and respected from the initial design sketches of a developer's scheme, making a wave of private capital available to support nature restoration across England.

A LEGAL CONTEXT

BNG as a policy has been designed, and has significant potential, to reconcile England's enormous development expansion plans and nature recovery objectives.

BNG is novel when compared to conventional philanthropic and ad hoc nature impact mitigation because it achieves four important things simultaneously:

- 1. Quantifies measurable habitat losses and gains through a universally applicable biodiversity metric;
- 2. Marries habitat losses to legally required habitat gains materially and temporally through trading rules and metric temporal multipliers;
- 3. Requires legally binding management and monitoring obligations to continue for at least 30 years from the creation and enhancement of habitats (or completion of the relevant development); and
- 4. Creates a natural-capital market in biodiversity units to encourage private sector investment into nature-restoration projects at scale.

A MEETING OF TWO ACTS

The development industry in England is already closely guarded and managed through the planning system - specifically, by LPAs - through a rigorous process of a developer applying for, and being granted, planning permission for a specific site. Planning permission will typically be granted subject to various planning obligations and conditions to make the development acceptable within the parameters of that authority's Local Plan and policies. Nationally Significant Infrastructure Projects are due to fall into scope for mandatory BNG in 2025. A number of infrastructure projects are nonetheless volunteering BNG on their schemes ahead of time.

Typical planning obligations or conditions could relate, for example, to the provision of schools, public open space and community infrastructure. BNG policy has been designed to efficiently piggyback on the existing local government planning infrastructure, relying on the work and capacity of planning officers for its implementation and enforcement. This ensures the biodiversity unit nature market created is tied neatly to the development's nature-impacting activities, empowering developers to fulfil their obligations to nature recovery.

Therefore, under the Environment Act 2021, BNG attaches itself to the existing planning regime in England through the insertion of a new Schedule 7A to the Town and Country Planning Act 1990. A developer's compliance with BNG policy is overseen through planning approval of a developer's biodiversity gain plan.

BOX 1. BIODIVERSITY GAIN OBJECTIVE

The obligation on developers to deliver at least a 10 per cent biodiversity uplift arises through the automatic imposition of the general biodiversity gain objective when planning permission for development is granted. The general biodiversity gain objective is at paragraph 2 to the new Schedule 7A of the Town and Country Planning Act 1990.²

This objective is met if the biodiversity value of a new development exceeds the pre-development biodiversity value by at least 10 per cent. The preand post-development biodiversity value is measured through the statutory biodiversity metric.

BNG has been mandatory for major development from 12 February 2024 and for small sites from 2 April 2024. There is a narrow and very specific list of exemptions to the policy, designed to ensure it does not inhibit very small-scale developments. The key thing to note is that, by definition, exemptions are designed to be few and far between.

THE BIODIVERSITY GAIN HIERARCHY

The biodiversity gain hierarchy contained at paragraph 37A of Part 7A to the Town and Country Planning (Development Management Procedure) (England) Order 2015 sets out the process a developer must go through before they are able to compensate for any impacts on habitats (see Figure 1).³ Mitigation hierarchies like this are essential to any healthy nature market as they ensure that nature-impacting organisations must, as a matter of law, first do what they can to avoid or minimise harm before relying on compensation measures. By definition, a mitigation hierarchy avoids, minimises, restores and offsets in order to reduce development impacts and control any negative effects on the environment.

How such a hierarchy is calibrated in law and policy can have a significant impact on how nature markets unfold. At one extreme, a mitigation hierarchy that chokes a buyer's access to compensation through nature markets can erode demand to the point of market failure. At the other extreme, easy access to undervalued compensation assets could accelerate and increase net overall harm to nature, if left unchecked. At its core, a genuinely nature-positive market will always be a residual market, which only comes to life once





Figure 1. The essentials of the biodiversity gain hierarchy. (Source: Environment Bank)



available buyer-side avoidance and mitigation measures have been deployed. The perfectly calibrated mitigation hierarchy enables a thriving nature market with the associated benefits and scale of private investment into nature recovery, without accelerating harm to a rate that erodes the intended gains.

ON- AND OFF-SITE BIODIVERSITY NET GAIN

Developers will often be expected to deliver some BNG within the development footprint (on-site) topped up with some biodiversity units generated off-site in a habitat bank, fuelling nature recovery in other parts of the country. On-site habitats can bring nature to people's doorsteps but can also be at greater risk of failure due to the ecological pressure from competing recreational uses. Off-site biodiversity units allow gains for nature to be delivered over larger areas in habitat banks that are better suited to the surrounding environment, giving the habitats a greater chance of thriving for the full statutory 30-year minimum management period.

CREATING HABITAT BANKS: THE LAW

Habitat banks are an efficient way of delivering off-site biodiversity units at scale for developers who are unable to create or enhance sufficient habitats within their development boundary. Habitat banks are created through section 106 agreements - made under the Town and Country Planning Act 1990 - and conservation covenants - made under section 117 of the Environment Act 2021.⁴ Both types of legal agreement take effect as local land charges, which means that they bind the land regardless of who owns it, in the same way planning permissions in England work. This ensures that the minimum 30-year management obligation is not easily terminated or extinguished through private agreement in the way that ordinary contracts or agreements between individuals can be. For example, Environment Bank recently secured a collection of BNG habitat banks under a conservation covenant with responsible body RSK Biocensus, covering almost 500 acres of land and delivering over 800 biodiversity units into this new market.



The role of these two types of agreement is to bind legal habitat management obligations to the land, while imposing ancillary legal obligations relating to matters such as enforcement, breach, step-in rights, penalties and habitat-management funding structures. As a minimum, BNG legal agreements would need:

- To contain a robust mechanism for dealing with disputes as to whether a habitat management plan has been dutifully followed (or not);
- Clear reporting requirements so that a planning authority is given meaningful and accurate progress information; and
- A suitable financial safeguard to ensure the long-term funding for the 30-year management works and that a contingency pot is available in an insolvency-proof bond.

The Planning Advisory Service (PAS) has recently launched a set of template BNG section 106 agreements that are now being adopted across the country.⁵

ANALYSIS

BOX 2. INTERLOCKING LEGAL FRAMEWORKS

Biodiversity net gain policy merges several legal disciplines because of its interrelationship between land ownership, land use, development and nature markets. Specifically, it covers:

- Environment Act 2021 and subsequent environmental legislation;
- Land law, agricultural law and leasehold tenancies;
- Planning and development management law;
- Contract law for habitat management agreements;
- Private client and inheritance planning for landowners;
- Finance law for bonds and letters of credit; and
- Taxation.



ROBUST FUNDING MECHANISMS

Section 106 agreements and conservation covenants will successfully bind land with ongoing habitat management obligations in strictly legal terms. However, if there is no cash available to fund those management actions over the long term, the legal obligations themselves can erode to the point of unenforceability. If a landowner is unable, now or at any time during the 30-year management period, to practically or financially honour those obligations, there is a significant breach and enforcement risk, and a danger that the gains for nature are not delivered. Suitable long-term funding mechanisms such as third-party financial bonds are, therefore, a fundamental pillar of successful on- and off-site BNG delivery. Financial bonds are not yet legislated for within the primary or secondary BNG statutes, but LPAs and responsible bodies are increasingly looking to see that adequate financial structures are put in place both on and off the development site. This is exemplified in the PAS habitat bank templates, where the concept of 'acceptable security' for the project has been incorporated.

If legal obligations for habitat management are not tethered to an adequate pot of cash to fund the works required in the long term, this risks undermining BNG effectiveness at a systemic level. Financial institutions and insurance underwriters have been building supportive financial products and services, which are now beginning to hit the market. As an example, the insurance company SCOR has launched a NatReCo - nature, restoration and conservation product, which is designed to de-risk nature restoration projects by covering unforeseen weather events, malicious damage and fire. Similarly, high street banks are adapting standby letters of credit normally used to provide financial security for shorter-term commercial transactions for use during long-term 30-year nature restoration projects.

INADEQUACY OF LEGACY MECHANISMS

Alternative legacy mechanisms for protecting or enhancing nature include flat taxation, philanthropy and locally run tariff systems administered through LPAs. Much of the criticism levelled at these alternative mechanisms is that they do not adequately link the harm to nature to the required gains, leading to unacceptable levels of leakage where the loss of habitats is not compensated for quickly enough, if at all. When the harm is not properly measured, or when the gains for nature are delivered to different timescales, it can lead to a 'pay to pollute' scenario, where pots of cash are collected but not spent quickly enough on projects to genuinely address the nature-impacting activities.

When compensation measures are seriously out of step with the original habitat losses, this leads to the problem of faster nature depletion through accelerated development, which is disguised through an ostensibly nature-positive green tax, tariff or charitable donation. BNG neatly addresses these shortfalls by measuring the harm and the gains and ensuring that the latter are secured before the former can take place.

CONCLUSION

BNG represents a significant global legislative milestone by elevating nature recovery from the realms of philanthropic giving and, instead, tying measurable biodiversity gains legally, ecologically, economically and temporally to nature-impacting activities. Pressure is building globally for organisations to demonstrate an honest and effective commitment to reaching nature-positivity.

Existing financial and sustainability reporting frameworks in Europe and the US legally require certain qualifying corporations to publicly report on their impacts and dependencies on nature. Corporations need to satisfy funders and shareholders that their assets will not be stranded because of their polluting effects while legislation inevitably tightens around them. As BNG policy beds in for developers in England and is refined over time as transparency in the system continues to improve, we can build on this important first step towards making nature economically visible so that more industries, in more locations can turn nature-positivity into business as usual. Our role in this is to help support legislators, policy-makers and stakeholders in other sectors and jurisdictions by bringing our lived and learned experience of BNG implementation to the table.

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REFERENCES

- State of Nature Partnership (no date) Home page. https:// stateofnature.org.uk (Accessed: 28 August 2024).
- UK Public General Acts (1990) The Town and Country Planning Act. https://www.legislation.gov.uk/ukpga/1990/8/contents (Accessed: 29 August 2024).
- UK Statutory Instruments (2015) The Town and Country Planning (Development Management Procedure) (England) Order. https:// www.legislation.gov.uk/uksi/2015/595/contents (Accessed: 29 August 2024).
- UK Public General Acts (2021) Environment Act. https://www. legislation.gov.uk/ukpga/2021/30/contents (Accessed: 29 August 2024).
- Planning Advisory Service (no date) PAS biodiversity net gain (BNG) legal agreement and planning condition templates. https://www.local.gov.uk/pas/environment/biodiversity-netgain-bng-local-planning-authorities/pas-biodiversity-net-gainbng (Accessed: 28 August 2024).



What will biodiversity net gain mean for smaller builders?

Rico Wojtulewicz speaks out about the challenges posed by the policy for the housebuilding industry.

The National Federation of Builders (NFB) and House Builders Association (HBA) have been at the forefront of the biodiversity net gain (BNG) debate in construction. However, while the housebuilding industry remains committed to the principles of reversing the UK's biodiversity decline, the current approach is presenting significant challenges to project delivery and even wasting opportunities to do more for the environment. Consequently, support for this noble aim is waning within the sector.

HOW THE FEDERATION GOT INVOLVED

The catalyst for involvement was the establishment of the great crested newt district licensing scheme. There was growing tension between the commercial impact of surveys, translocation and protection failures, and the lack of comprehensive data, which meant the mitigation licence scheme was not working efficiently, particularly for great crested newts.

When district licensing brought in eDNA analysis to map newts and their habitats, there was better information and funding for conservation, which allowed development to start more quickly. Naturally, this prompted the industry to ask whether other protected species could benefit from a similar mapping and licensing exercise. Although it was more complex

OPINION

than simply putting a similar process in place, and in some cases inappropriate, the demand highlighted the UK's need for greater levels of data to map species, centralise appropriate habitat knowledge and support ecological innovation.

This formed the basis for how concurrent engagement with Natural England on BNG implementation was considered. HBA board members took it upon themselves to explore how BNG could benefit as many stakeholders as possible while addressing trade-offs to tackle and consider the long-term outcomes of such a policy. One went as far as to purchase land to understand the practicalities.

After a year of research and discussion, and before the 2020 Environment Bill was drafted, the HBA concluded that on-site solutions were key to unlocking the greatest number of positive outcomes and to filling the obvious gaps that existed in the proposed BNG strategy.

On-site BNG was found to be beneficial for several reasons, including:

- Closing the data gap by addressing the lack of data concerning species location and movement;
- Enabling direct targeting of local species;
- Improving habitats, which resulted in rolling back lesser or inappropriate habitats (many created in the last century) being replaced rather than bettered;
- Taking a bottom-up approach using mapping via surveys and baseline studies;
- Providing a stronger basis for growth by using ecological technology (e.g. habitat surveys and automated approaches);
- Involving local authorities by positioning spatial planning as central to delivery;
- Cutting costs by reducing what developers paid in tax while ensuring new development was not a biodiversity barrier or, worse, leading to more lost greenfield and Green Belt land;
- Addressing viability challenges by offering solutions to the issues posed by mosaic habitats; and
- Protecting farmland by preventing it from being swallowed up to provide BNG units.

A very basic explanation of the HBA's on-site BNG proposal was for sites of up to 50 homes – a site size that will disproportionately rely on off-site BNG units or that would be made unviable due to BNG costs – to be part of a trial taking place during the transition period. This would test on-site fabric (i.e. the building itself) and site designs, such as human-made habitats, lighting spectrums, habitats to provide food, nesting and pollination for local species, and sustainable drainage. The results of the trial would inform how and whether on-site fabric and site design solutions should be included in the BNG metric.



Less-tangible biodiversity gain outcomes were also recommended for consideration, such as funding to support species mapping and data collection, technological innovation, greater public participation in nature recovery and improved infrastructure connection to nature itself, such as railway stations in national parks.

While the trial's starting point was to ensure that development was not unfairly and disproportionately impacted, it was accepted that biodiversity recovery was vital. There was also an understanding that builders do not pretend to understand biodiversity, which is why they rely on ecological consultants, and so on-site solutions would embed some level of knowledge requirement within every development business.

UNINTENDED CONSEQUENCES

Unfortunately, despite Defra and Natural England acknowledging and welcoming the HBA's proposal to include members on the steering group for the small sites metric (SSM) – a tool that calculates BNG on sites with fewer than 10 homes – and Defra requesting direct dialogue between the HBA and Environment Bill Committee, this only resulted in the inclusion of green roofs in the metric. This confirmed that BNG was a habitat metric that did not seek to focus on biodiversity; it also led to the complex 'built for builders to use' SSM tool demoralising builders into disengaging with BNG, in the Government failing to follow up on the HBA's committee contributions and in No 10 disregarding the association's unintended consequences warnings.

Many of these warnings were commercial considerations; contrary to the belief that developers make millions in profits, the reality for most builders is quite different. Developers toil for years to secure planning permission, ultimately making a 5–10 per cent project profit. This then gets ploughed back into repaying business costs and lending charges, with the hope that there is enough left over to forward-plan for the next scheme. For smaller builders in particular – those delivering up to 150 homes annually, and especially those delivering up to 50-home sites – BNG had the potential to close businesses, threaten project viability or turn into an off-site tax if implemented poorly.

With the implementation of BNG, this is indeed happening, and it is making affordable housing increasingly impossible to deliver. For those few developers who can make it work, BNG has become an off-site tax because that is the path of least resistance.

BIODIVERSITY NET GAIN PROJECT IMPACTS

There are three development projects that aptly illustrate the challenges posed by BNG for small developers.

1. South-west coast: A 26-home development is facing the elimination of affordable housing to pay BNG



costs. Local authorities will not accept blue-line land or off-site solutions because either option will need a section 106 legal agreement. Furthermore, the authority's Local Plan has been reassessed to consider the impact of BNG, but has concluded that the new supply expectations, including affordable housing, are still viable.

- **2. North-east:** At a former now-flooded quarry, defined as brownfield land, the landowner cannot make the project viable due to BNG costs; however, they recognise that they are also sitting on millions of pounds of potential off-site BNG units. As an allocated housing site in the Local Plan, the site will not be able to deliver the more than 300 homes it is earmarked for. Early discussions suggest a greenfield site with low biodiversity value out of town may be used instead.
- **3. The Midlands:** Development of a commercial warehouse on a brownfield site that sits in an open mosaic habitat will not be given any metric recognition for creating species pathways; instead, the developer will have to pay an estimated £1.8 million in off-site BNG credits to compensate for habitat loss.

In these three projects, one eliminates affordable housing during a cost of living crisis. A second will result in the loss of more greenfield land because a habitat added within the last half century is deemed too valuable to lose. And a third will be providing much-needed employment space but will see the creation of on-site habitat limited as high mitigation costs require developable land to be maximised.

Some may question why the landowner in the second example is not overjoyed that BNG makes more money than housing. Builders prefer to build homes rather than profit from land transactions but, more importantly, it highlights how exasperating the BNG policy can be and why it is important to appreciate the unintended consequences.

In all three schemes, biodiversity is an afterthought, not just because projects must be made viable but because the metric is more interested in any habitat – not one designed to underpin local biodiversity needs while facilitating a regional and national biodiversity strategy. For smaller builders this problem is exacerbated, as many large sites will be on the least-biodiverse land where there will be enough space to introduce habitats and deliver on-site solutions as well as to build up BNG units for future use. Smaller builders will not have this luxury and will be left with the choice of 'two homes or a pond'. In reality, this is not a choice; rather, it quashes project development and stifles biodiversity.

Some campaigners will welcome this quandary, as they believe all new homes pose a challenge to biodiversity. However, realistically, these homes will be built elsewhere, typically on larger sites on the edges of a community, pushing people toward greater car dependency and creating infill zones for future housing and urban sprawl.

Beyond biodiversity outcomes, since larger builders will be able to navigate the policy more easily, levels of directly employed construction workers will drop and fewer apprentices will be trained – small and medium-sized enterprises (SMEs) typically employ and train eight out of ten construction apprentices.¹ We will also see more identikit estates. And because SMEs typically contract for others, it will also become more challenging to deliver social, housing association, self-build, community land trust and co-operative housing. Additionally, fewer ecological roles and innovations will emerge as the role for ecology becomes centralised and standardised.

The decrease in innovation is particularly relevant. This is because advancements in lighting spectrums, drainage systems, building fabric habitats, automated surveying and habitat management are increasingly vital tools for expanding biodiversity and, more importantly, sustaining it. This disproves the marginal gain reasoning given by Defra for rejecting on-site fabric and site design strategies.

WHY SUPPORTERS ARE BECOMING DETRACTORS

The NFB was the first professional construction federation to back BNG, with on-site solutions seen as a crucial part of the ambition to make BNG work for builders and biodiversity. However, when the SSM excluded most SME housebuilders because it was limited to 10 homes and not the recommended 50, its complexity grew, on-site fabric solutions were limited and local species strategies were rejected in the BNG calculator. It seemed that the housebuilding industry was thinking more about biodiversity than many BNG-shaping ecologists.

This led to the NFB spending five years lobbying Government to support SME builders' on-site BNG solutions in a 'Building in Biodiversity' trial. The effectiveness (or lack thereof) of proposed on-site solutions was expected to support the existing research and demonstrate that BNG gains were not marginal, giving the Government greater certainty in the BNG metric implementation.

Unfortunately, despite Ministers expressing surprise that BNG was a broad habitat metric that may introduce more inappropriate habitats, does not account for habitat that supports local species and makes no effort to increase and map our knowledge of local biodiversity needs, no one wanted to engage further with a trial. Communication with No 10 resulted in some favourable comments regarding the proposal for garden habitat covenants, but on-site solutions remained absent from the Government's thinking, with the credit market repeated as the solution. Further conversations with Number 10 came to nothing, apart from an eventual request for Defra officials to meet with HBA representatives fortnightly to discuss industry concerns. These meetings have so far been useful in highlighting the following issues:

- The ending of BNG legal agreements and off-site unit agreements before planning permissions are settled;
- Section 106 wording disagreements and variations across local planning authorities (LPAs);
- Undeveloped brownfield land habitats increasing in value;
- The ecology sector lacking the capacity to deal with minor (fewer than 10 homes) and smaller sites (up to 50 homes);
- LPA departments lacking the necessary skills to manage BNG, with planners and ecologists often contradicting each other;
- Councils still preferring ecologists as the most trusted route rather than competent persons (someone able to identify site habitat types) or automated tools when using the SSM;
- Biodiversity baselines being requested for BNG-exempt developments;
- Too few available off-site BNG fractional units and a general lack of units, particularly along watercourses;
- The statutory BNG credit process being underdeveloped and not ensuring a competitive BNG unit market;
- Concerns that brokering profiteers are taking advantage of landowners and developers;
- LPAs not accurately assessing the impacts of BNG and consequently ignoring the effects on new home supply, affordable housing and planning contributions;
- Planning departments seeking resubmissions of pre-BNG-consented schemes so that BNG could be applied;
- Restrictions on the months during which BNG surveys could be completed;
- Higher planning fees for red-line boundary BNG; and
- Pre-development habitat loss on safety grounds remaining part of the BNG metric.

These issues are only a handful of developers' concerns, but they are being repeated and slowly turning the industry against BNG; many developers are proposing it is treated as another planning gain and a straight tax based on site size, with funds going to Natural England. From an outcome perspective, this makes sense. A complex system that penalises most developers, delays decisions, makes legal agreements more complex and costly, and renders schemes unviable merely adds to an already broken planning system. Yet it would be a shame to lose a scheme that, implemented correctly, could significantly benefit biodiversity.

The Government's view remains that the unit market will solve the problems we face and that off-site BNG costs will come off the land price. But this ignores the scarcity of available units, the loss of farmland and competing schemes like nutrient neutrality and



energy. BNG is making some land worthless, driving up the price of developable land due to Local Plans allocating the bare minimum of sites, landowners not needing to sell and SMEs being squeezed out because they are competing for land with investors and non-builders that do not understand the cost of compliance. Every new development tax or regulatory cost has been introduced with the expectation that land prices will factor them in and consequently decrease; yet land prices continue to rise and planning continues to take longer to achieve, exposing projects to material price inflation.

SO WHAT NOW?

Unfortunately, a policy intended to focus on on-site biodiversity gains has predictably ended up being an off-site tax, with strong suspicions that the greatest beneficiaries are not landowners or the environment but brokers.

Smaller developments of up to 50 homes will struggle to deliver BNG, consequently requiring off-site units or credits and creating barriers to wildlife corridors rather than building in greater biodiversity. Many frustrations could be alleviated by embedding building fabric and site design solutions into the BNG metric and having LPAs shape local and regional biodiversity needs that are based on local data.

Stratford-on-Avon's Supplementary Planning Document Part N: Biodiversity and Green Infrastructure already recognises the localised biodiversity fabric and site design opportunities.² These approaches could be supported by biodiversity-enabling evidence, such as those offered by B-Lines and hedgehog highways, the Glasgow Naturalist's sustainable drainage systems and amphibians study, and Bug Life's artificial light research. $^{\rm 3,4,5}$

These studies and some on-site solutions are explored in the NFB's Building in Biodiversity document and, far from being marginal, they prove the importance of understanding, mapping and embedding nature within the built environment.⁶ Missing the chance to measure and prove their value due to a preference for a different strategy that has not been measured is not progressive. But neither is sabotaging the building industry.

For smaller builders, BNG is sounding a death knell, and the environmental outcomes are equally flawed. Unless more ecologists are willing to speak up and help politicians find the confidence to lead, it looks likely that BNG will embed biodiversity barriers, do less than it should for biodiversity, reduce both the number of new housing and affordable housing and see many of the best builders sacrificed at the cost of more green space loss.

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REFERENCES

- GOV.uk (2024) 'Apprenticeship starts and achievements by enterprise characteristics' from 'Apprenticeships in England by industry characteristics'. https://explore-education-statistics. service.gov.uk/data-tables/permalink/e760a840-a18a-4ceb-a5f1-08dcc2b24c73 (Accessed: 16 September 2024).
- Stratford-on-Avon District Council (no date) Development Requirements Supplementary Planning Document (SPD). https://www.stratford.gov.uk/doc/207802/name/PART%20N%20 Biodiversity%20and%20Green%20Infrastructure.pdf (Accessed: 16 September 2024).
- The British Hedgehog Preservation Society (2021) Research: hedgehog highways. https://www.hedgehogstreet.org/ researching-hedgehog-highways/ (Accessed: 16 September 2024).
- 4. O'Brien, D., Hall, J., Miro, A., Rae, M. and Jehle, R. (2018) SuDS and amphibians – are constructed wetlands really benefitting nature and people? *Glasgow Naturalist*, 27 (Supl.). https:// salford-repository.worktribe.com/output/1376017/suds-andamphibians-are-constructed-wetlands-really-benefitting-natureand-people (Accessed: 16 September 2024).
- Bruce-White, C. and Shardlow, M. (2011) A Review of the Impact of Artificial Light on Invertebrates. Buglife – The Invertebrate Conservation Trust. https://theilp.org.uk/publication/a-reviewof-the-impact-of-artificial-light-on-invertebrates/ (Accessed: 16 September 2024).
- Wojtulewicz, R. (no date) Building in Biodiversity. Embedding Building Fabric and Site Design Solutions into the Biodiversity Net Gain Metric. National Federation of Builders. https://www. builders.org.uk/wp-content/uploads/2024/03/Building-in-Biodiversity-Final-Public-1.pdf (Accessed: 16 September 2024).



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