Title: Biodiversity net gain for Nationally significant infrastructure projects **IA No:** **RPC Reference No:** **Lead department or agency:** Department for the Enviroment and Rural Affairs **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 25/11/2021 **Stage:** Consultation **Source of intervention:** Domestic **Type of measure:** Policy statement **Contact for enquiries:**

Summary: Intervention and Options

RPC Opinion: Awaiting Scrutiny

Cost of Preferred (or more likely) Option (in 2019 prices, 2020 present value)			
Total Net Present Social Value	**Business Net Present Value**	**Net cost to business per year**	**Business Impact Target Status**
£107m	-£75m	£8.7m	Qualifying provision

What is the problem under consideration? Why is government action or intervention necessary?

The problem under consideration is how best to internalise the impacts on biodiversity of Nationally Significant Infrastructure Projects (NSIPs). Nationally significant infrastructure projects (NSIP) are major infrastructure developments in that bypass normal local planning requirements. These include proposals for power plants, large renewable energy projects, new airports and airport extensions, and major road projects. Several market failures lead to lower levels of biodiversity than is socially optimal. The foremost are negative externalities and the public good aspect of biodiversity but imperfect information and equity also play a role. A policy of biodiversity net gain is already being introduced for development as covered by the Town and Country planning act. This assessment looks at extending that policy to NSIPs to maintain consistency of approach and deliver further benefits.

What are the policy objectives of the action or intervention and the intended effects?

The primary aim is to secure a measurable improvement in habitat for biodiversity whilst streamlining development processes. The objectives that have guided policy development to date are that net gain: (1) delivers habitat creation and/or enhancement, meeting the government's ambition to leave the environment in a better state than it inherited it; (2) is simple, streamlined, and certain for developers, easy to understand and will not prevent, delay or reduce development (housebuilding in particular); and (3) is of clear benefit to people and local communities.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 1: Do – nothing. The net gain policy is not extended to NSIPs leading to habit loss on approx. 740 hectares per year. This in turn leads to a loss of eco system services to the local population.

Option 2: Do not set a requirement through legislation. Continue to make incremental changes to National Policy Statements and wider policy to encourage biodiversity net gains.

Option 3 (preferred): Issue a Policy statement to apply a biodiversity net gain policy to NSIPs
This would ensure that NSIPs follow a biodiversity net gain approach. Developers of NSIPs would have to assess the habitats on the site and deliver a net gain in biodiversity of 10%. Delivered either onsite, offsite by a private sector provider or by purchasing government credits.

Will the policy be reviewed? subject to further consultation and ongoing evaluation. **If applicable, set review**

Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	**Micro** Yes	**Small** Yes	**Medium** Yes	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:**	**Non-traded:**	

date: 05/2022

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits, and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: ..... Date: .....

Summary: Analysis & Evidence

Policy Option 3

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year 2022	PV Base Year 2023	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -215	**High:** 371	**Best Estimate:** 126

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.02		3	**22**
High	0.02		33	**276**
Best Estimate	0.02		14	**117**

Description and scale of key monetised costs by 'main affected groups'

Familiarisation costs (transition) – There will also be a one-off familiarisation cost to NSIP developers. Due to the small number of firms developing NSIPs, this is expected to be a relatively low cost of approx. £19,000.

Cost of delivering biodiversity units (developers) (Ongoing) – Developers will face a cost of delivering bio-diversity units to offset the loss created by their developments plus an additional 10%. Annual average £14m (£3m - £33m).

Other key non-monetised costs by 'main affected groups'

Planning Inspectorate - There may be additional costs to the Planning Inspectorate however they already have a requirement to assess the need for ecological mitigation and as such the marginal cost of adopting the policy should be minimal.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0		8	**61**
High	0		48	**393**
Best Estimate	0		31	**242**

Description and scale of key monetised benefits by 'main affected groups'

Amenity value of additional green space close to residentially addresses – Natural capital benefits for those living nearby have been estimated to be £62m per year once in steady state (£41m - £70m). Steady state isn't achieved until 2027/28, hence this is lower than the average annual cost set out above.
The amenity value includes a bundle of cultural services that arise to people from being close to natural assets, including aesthetic and visual benefits, tranquillity, and recreational opportunities.

Other key non-monetised benefits by 'main affected groups'

Wider ecosystem services – increased biodiversity will likely deliver a host of wider ecosystem services that are either intangible or hard to directly link to the policy intervention. These include benefits like contributions to flood management, carbon sequestration and water quality.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5

Assumptions – Sensitivity applied to key assumptions: Cost of onsite/offsite units, percent of units delivered onsite, lag in benefits realisation and value of the benefit. The Net Present Value improves by £245m in the high scenario and fall by £339m in the low.

Risks Key risks include:

- Geographical differences in unit price incentivising offsite units and skewed distribution of biodiversity (mitigated by the metric penalising offsite).
- Perverse incentives for landowners to maintain potential development land in a low biodiversity condition to make it more palatable to developers. (partially mitigated through Environment Bill provision to allow for temporary enhancements to biodiversity without penalty)

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 10	**Benefits:** 0	**Net:** 10	44

Contents

Evidence Base

Problem under consideration and rationale for intervention

This Impact Assessment appraises the costs and benefits of extending the biodiversity net gain policy to Nationally Significant Infrastructure Projects (NSIPs). Biodiversity net gain aims to address the contribution some development makes to the sustained decline in biodiversity that the UK has experienced over recent decades (and indeed longer). Specifically, approx. 740 hectares per year are developed into NSIPs representing a loss of just under 10,100 biodiversity units per year[1].

The broader policy of biodiversity net gain has been assessed in detail in the Biodiversity net gain and local nature recovery strategies Impact assessment published in 2019.[2] This new assessment focuses in on the decision to explicitly apply this policy to NSIPs. The rationale for intervention is broadly similar but the most relevant content of the previous impact assessment has been repeated below for ease of review. The appraisal of the evidence focuses in on the key impacts of extending the policy to NSIPs and assesses whether it results in a net welfare increase for society.

The rational for intervening is that the decreases in biodiversity to current levels (and beyond) are not reflective of social optimal amount of biodiversity. Put differently in the absence of further intervention biodiversity will continue to be undervalued through development by the market and the government. This is due to a number of market failures.

Public goods - goods and services that are non-rivalrous and non-excludable are subject to non-provision by the market alone.

Habitats are a major component of our natural capital; with the biodiversity they support underpinning the delivery of many ecosystem services[3]. Many ecosystem services are non-excludable (i.e. you cannot prevent someone else enjoying the mental health benefits of viewing nature out of their window) and non-rivalrous (i.e. the benefit you derive from seeing the nature in a green space does not affect the benefit derived by someone else), and are not usually directly rewarded financially by the market (for example, if you created one hectare of habitat, the market rate you are likely to be paid is unlikely to include the full economic value, which would include the environmental benefits). Lack of coordination and incentives leads to significant under provision (or no provision) by the market. Habitat creation is likely to be underprovided (and losses undervalued) by NSIPs developers, as demonstrated by the inconsistent adoption of net gain approaches across projects for the last ten years[4].

Externalities - there are wider positive (negative) impacts on others which are not considered by the individual making the decision, leading to under (over) provision.

Land use change through infrastructure development imposes a range of positive and negative environmental externalities (for example, habitat provision/loss, remediation/pollution) with consequent social and economic impacts. These impacts are not fully internalised in development decisions, leading to a tendency towards habitat loss and other environmental damage. This is demonstrated by historical trends in biodiversity and habitat loss outlined earlier.

[1] Based on data gather from development consent order and Ordnance survey mapping, discussed in more detail under the methodology section

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839610/net-gain-ia.pdf

[3] http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx. See Chapter 4 on biodiversity in the context of ecosystem services

[4] Currently 12.5% of projects currently meet net gain. This is based on data gather from development consent order and Ordnance survey mapping, discussed in more detail under the methodology section.

Habitat creation and biodiversity deliver ecosystem services (e.g. carbon sequestration, water quality, flood regulation) that both mitigate negative externalities and deliver positive externalities[5]. While the delivery of net gain has financial costs (such as onsite habitat creation) and potential financial benefit (for example, through sale or rent value), the non-financial benefits (i.e. ecosystem services) are not fully internalised in development decisions, leading to under provision. The adoption of net gain policies by some developers, industry bodies and planning authorities shows some recognition of the environment in development decisions, but the adoption is inconsistent and not widespread enough for it to be fully internalised without financially disadvantaging the projects that do so.

As highlighted earlier, biodiversity is declining and therefore not in a steady state of equilibrium. Failure to successfully intervene does not result in remaining at a sub optimal equilibrium rather it would represent continued movement away from the social optimal equilibrium.

The main stakeholders affected by the proposed policy are the UK public who live and work around NSIPs and developers of NSIPs. Data on NSIPs is based on a snapshot of the last ten years[6]. In the snapshot 65% of NSIPs are private sector and 35% public. The split across industries is 50% Energy, 3% Ports, 30% Highways and 10% Rail, 8% other[7]. The proposed policy will mean these sectors have to pay the full economic costs of development by compensating for the reduction in biodiversity caused by their development. Whilst it is normally expected that land-related costs would be passed into the land value, the geographic inflexibility of many NSIPs means that it's more likely that most developers will absorb the costs or pass the cost directly on to their customers. In the case of many of these projects that will be the UK taxpayer.

Rationale and evidence to justify the level of analysis used in the IA (proportionality approach)

The level of evidence used is discussed throughout this impact assessment as pieces of evidence are introduced. There are three areas of greater uncertainty where more information will be gathered during consultation. These are:

1. The cost of biodiversity units
2. The percentage split between offsite and onsite delivery
3. The relationship between amenity value and the number of biodiversity units

Description of options considered

A full list of options is considered in the published biodiversity net gain impact assessment. This impact assessment specifically focuses in on the decision of whether to include NSIPs as such the options in this assessment have been limited to inclusion or exclusion of NSIPs.

Option 1: Do – nothing.

Doing nothing in the context of NSIPs would involve taking forward biodiversity net gain and applying it to land development as captured by the Town and Country Planning Act (1990)[8]. This however would not include NSIPs. As a result, an average of approx. 740 hectares per year would be developed without offsetting action to reduce biodiversity loss[9]. This in turn leads to a loss of ecosystem services to the local population.

[5] http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx

[6] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[7] May not sum due to rounding

[8] https://www.legislation.gov.uk/ukpga/1990/8/contents

[9] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

Option 2: Do not set a requirement through legislation and continue to make incremental changes to National Policy Statements and wider policy to encourage biodiversity net gains.

This proposal was criticised by many respondents in the 2018 net gain consultation and in parliament during the passage of the Environment Bill. The basis for these concerns was that this option amounted, in practice, to continued uncertainty for projects as to whether biodiversity net gain would be required and a risk that the timelines for policy changes may mean that the benefits of net gain are not realised for a long time.

Option 3: Apply a mandatory biodiversity net gain requirement to NSIPs.

This would ensure that NSIPS follow a biodiversity net gain approach. The nature of the Environment Bill provisions (amending the Town and Country Planning Act) meant that it would not be possible to simply bring NSIPs into scope of that requirement and so an approach was developed which was appropriate for the Planning Act regime. The requirement will therefore be set through policy statements that will be considered in the consenting of NSIP projects. Developers of NSIPs would have to assess the habitats present on the development site and deliver a net gain in biodiversity of, at least 10%[10]. There would be three ways for developers to achieve this, beyond avoiding impacts in the first instance:

1. Build delivery of the increased biodiversity into their development plans (onsite delivery);
2. Pay another landowner to deliver the required biodiversity (offsite delivery);
3. Pay the government to deliver the biodiversity (credit system)

These options mirror the broad approach for biodiversity net gain which was consulted on for Town and Country Planning Act development, and received broad support, in 2018[11].

Policy objective

The primary aims of the policy regarding NSIPs are broadly similar to the overarching biodiversity net gain policy set out in the IA[12]. One area that comes slightly to the fore is consistency, clarity, and simplicity. Ensuring NSIPs are covered creates a consistent process for all developers and avoids confusion between different developments.

The objectives that have guided policy development to date are that net gain:

- delivers habitat creation, meeting government's ambition to leave the environment in a better state than it inherited it for the next generation
- is simple, streamlined, and certain for developers. It is easy to understand and will not prevent, delay, or reduce housebuilding
- is of clear benefit to people and local communities.

Successfully extending the policy to NSIPs will further assist in addressing the market failures outlined above. It will subject NSIP developers to the same framework as other developers and require them to internalise a fuller range of costs and benefits into their decision making and thereby create habitats that add value to society[13]. Crucially the policy leaves the method of delivery up to the market thereby utilising free market incentives and innovation to deliver the outcome in the most efficient way.

[10] Annex B discusses the reason for selecting 10% in more detail

[11] 78% responded 'Yes' when asked: "Should biodiversity net gain be mandated for all housing, commercial and other development within the scope of the Town and County Planning Act?", Page 18, source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/819823/net-gain-consult-sum-resp.pdf

[12] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839610/net-gain-ia.pdf

[13] https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/ecosystemserviceaccounts1997to2015. The latest (release date 30th January 2018) partial asset value of UK natural capital is estimated to be £761 billion in 2015.

Summary and preferred option with description of implementation plan

Government amended the Environment Bill in July 2021 to apply a biodiversity net gain approach for NSIPs (in line with option 3 in the previous section). The amendment requires the relevant Secretary of State to set the requirement by creating biodiversity gain (policy) statements which set out the full detail of the approach. Statements may act as standalone policy documents (as "separate biodiversity gain statements") and would be integrated into National Policy Statements for individual project types as and when reviews occur.

The 2021 biodiversity net gain consultation covers some of the high-level questions about how the requirement should be applied to NSIPs. Because biodiversity net gain is being applied to both regimes with the same objectives, it is broadly assumed that the process and policy applied for NSIPs will be consistent with that proposed for development consented under the Town and Country Planning Act. The consultation asks about transition arrangements, with a stated intention to apply the requirement to new projects after a transition period of at least two years, but ending no later than 2025. It is suggested that the commencement threshold is a project's acceptance by the Planning Inspectorate (PINS) for examination.

We understand from early engagement with stakeholders and PINS that policy consistency across NSIP types will be helpful where possible. We therefore propose to use this 2021 consultation on key policy questions and further engagement with industry, PINS, National Infrastructure Planning Association (NIPA) and statutory consultees to inform development of a draft 'core statement'. This would then be subject to further consultation and refinement before implementation.

Monetised and non-monetised costs and benefits of each option (including administrative burden)

Methodology

This assessment uses both spatial and economic analysis to isolate the costs and benefits of introducing a biodiversity net gain requirement for NSIPs. Spatial analysis was used to calculate the area of land involved and economic assessment added the costs to developers and the natural capital benefits of additional biodiversity to the surrounding population.

Data collection and Geo-spatial analysis

Defra collected data for 82 NSIPs, for which planning permission had been decided between 2011 and 2021. Of this set, a sample of 24[14] available project plans was reviewed; this represents approximately 30%[15] of the terrestrial NSIPs consented since the Development Consent Order (DCO) system was created.

Defra and Ordnance Survey digitised and overlaid publicly available project plans onto an OS master-map (OSMM) layer in QGIS[16]. Where projects had completed construction, pre and post-construction OSMM land cover datasets were compared.

Economic analysis

This section quantifies costs and benefits of implementing option 3: biodiversity net gain for NSIPs against a baseline of Option 1: Do nothing. It is important to note that the Impact

[14] The sample of 24 was considered proportionate at this stage, DEFRA will look to analyse further projects plans ahead of the final impact assessment.

[15] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[16] QGIS is an open source software package

assessment on the broad policy will have captured some of the costs and benefits of NSIPs, particularly under the land use change data for transport and utilities. This assessment focuses in specifically on the NSIPs element.

Costs

Transition

Familiarisation costs (developers)

Familiarisation costs will be imposed on developers as they will need their employees to familiarise themselves with the policy and how to apply it. This impact is monetised by estimating the employee time required for familiarisation and the wage of employees. The training could be done through formal sessions or on-the-job. Those requiring training would include a mix of ecological consultants, planners, and landscapes architects, expected to last up to one working day[17]. There were 48 companies that applied for and received permission in the last ten years[18]. Assuming they need 1 day to train up two employees each (for example, an environmental assessment coordinator and ecology lead) and an average salary for relevant job roles of £39,921 this gives a one-off familiarisation cost in 2023/24 of just under £18,000[19]. Both assumptions are uncertain, it could reasonably range from 1 to 5 employees and salary costs could vary between £37,400 and £42,420. Whilst the uncertainty is large it has very little effect on the value for money of the project. For example, doubling the amount of time required for training from one to two days, impacts NPV by less than £50,000.

We assume that wider industry familiarisation, for example within ecological consultancy firms, is applicable in the do nothing option as well as option 3 given that the current policy trajectory and provisions for Town and Country Planning Act development will require routine biodiversity net gain assessments. Indeed, familiarisation may be more expensive in the 'do nothing' option as less standardised proprietary approaches to BNG proliferate. Therefore the costs associated with this are not captured.

Ongoing

Biodiversity units (developers)

The new policy will require developers of NSIPs to deliver a 10% increase[20] in biodiversity units as calculated using a biodiversity metric, based on the habitats present on the development site. This represents an additional cost to them of creating biodiverse habitat.

This cost has been estimated by taking an estimated cost of off-site biodiversity units and multiplying it by the amount of units required to deliver a 10% increase from the pre-development baseline.

Calculating the required number of biodiversity units

[17] The UK Green Building Counsel offers a half day masterclass course, extra half day added for course reading

[18] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[19] Calculation based on an equal mix (32 of each across the 96) of ecological consultants (salary £42,395, Source: CIEEM salary and employment survey 2017-18, uprated to 2022 prices), Planners (salary £39,962, Source: ASHE 2017 town planner (quoted by CIEEM), uprated to 2022 prices) and Landscape architect (salary £37,407, source: Comparison of job adverts for landscape architects, uprated to 2022 prices). 22% uplift for non-salary costs is then added.

[20] See Annex B for further discussion on why 10% has been selected

The required number of biodiversity units was calculated by mapping Ordnance Survey Master Map categories into the appropriate UKHab[21] habitat categories and assigning habitat values in accordance with the pre-release version of Biodiversity Metric 3.0. Then, the change in biodiversity value over the course of development was calculated, and the shortfall in post-development units needed to reach a 10% net gain in biodiversity for each project in the sample estimated. This analysis is not as accurate as having an ecologist survey the habitats in person. However, the digital mapping was judged by DEFRA ecologists and economists to provide an accurate enough portrayal of the likely biodiversity for the purposes of this assessment. In person assessments of each of the individual 24 sites is deemed to be disproportionately expensive given it will only provide a slight change in accuracy and because the detailed habitat information is so specific to a particular project.

Based on the sample, 10,100 biodiversity units are expected to be lost over a ten-year period from a pre-development baseline of 37,100, giving an expected figure of 27,000. Adding ten percent to the pre-development baseline gives a figure of 40,800 units required post development. This left a requirement above the do-nothing option of 13,800 units over ten years. It is worth noting that the sample showed that approx. 12.5% of projects already achieve net gain[22]. Projects already meeting the requirement are factored into the figures used in the assessment of costs and benefits to ensure they are assessed against an accurate do-nothing baseline.

Where projects were incomplete, pre-construction data was obtained[23], and a reasoned assessment was made about the likely soft habitat changed. This was then mapped into units based on the same methodology as above. The assessment was informed by the results of completed projects. It therefore relies on the assumption that incomplete projects will have similar end habitats to completed projects. Whilst this assumption is reasonable it does affect a large section of the sample, 15 out of the 24 sample projects were incomplete. After applying this assumption, the average amount of biodiversity units required for complete projects is 127, for incomplete it is 193. This suggests the assumption is conservative way given it results in greater estimated net gain requirement for incomplete project than the average net gain required for complete projects. In reality the incomplete projects may need a level of units more in line with completed projects and will therefore be less costly to achieve net gain.

Estimating the cost per biodiversity unit

Developers have a choice of whether to deliver units onsite or pay for them to be delivered offsite. The costs of both onsite and offsite units are uncertain[24] as the market for biodiversity is still very nascent and depends heavily on space available and relative land values.

The percentage split developers will choose between these two delivery options is not currently known. The biodiversity metric favours onsite delivery hence there is a lower cost of delivering units onsite. Units created outside of the Local Planning Authority (LPA) of the development but within a neighbouring LPA are worth 75% of a full unit, units outside of this are worth 50% of a full unit[25]. For this assessment it assumed offsite units are delivered within a neighbouring LPA and have therefore been modelled at 75%[26].

[21] https://ukhab.org/

[22] Based on the data collected from Development consent orders and Ordnance Survey, further detail set out under the methodology section.

[23] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[24] See sensitivity analysis for further analysis and discussion

[25] Note that the current version of the metric applies this multiplier to the created habitats, not the off-site baseline. This can result in a more significant reduction in units created when baseline biodiversity values are significant.

[26] In the current version of the biodiversity metric (3.0) this is applied to created or enhanced off-site habitats but not the off-site baseline score, resulting in a stronger incentive than is suggested by the multiplier value alone.

The available evidence suggests that the majority of mitigation will take place onsite. Eftec surveyed all types of developers asking 'what % of the net gain requirements would you be able to meet on-site?'[27]. 26% of respondents (highest scoring response) said 50% to 75% onsite. The next two highest response categories were 75% to 100% and 0% to 25% both receiving 22% of responses. The bi-model response pattern is difficult to interpret. It suggests the most likely value will be between 50% and 100% (52% of respondents[28]) but that a significant minority (likely in highly urbanised settings) will deliver under 25% of units onsite (26% of respondents[29]). This aligns with the assumption made in the broader Biodiversity net gain consultation impact assessment where it was assumed 75% of net gain would be delivered on-site – this was not challenged in consultation responses and was supported anecdotally. Indeed, recent evaluation of current practice (which is not directly comparable to mandatory biodiversity net gain proposals) found even higher levels of on-site delivery for a range of Town and Country Planning Act developments[30]. Therefore, the assumption of 75% has been caried through into this analysis of NSIPs. The impact of this assumption is tested with sensitivity analysis below. If 100% on units are delivered onsite it reduces costs by approx. £80m, if only 50% are delivered onsite then it increases costs by approx. £80m.

The cost of offsite biodiversity units is based on analysis by Eftec of the biodiversity unit market[31]. These are estimated as £20,000 in LPAs without scarcity, and £25,000 in LPAs with scarcity (2020 prices). Based on this information, and the ratio of LPAs with scarcity against those without, Defra calculated an average national biodiversity unit market price. A mark-up of 10% for search costs was added, and the total adjusted from 2020 to 2022 prices. This gave an offsite unit price of £22,800[32]. As the market for biodiversity units isn't fully developed this price is highly uncertain and could range from £14,000 to £30,000 (impacts of this on value for money are covered in the sensitivity analysis). Combining the central estimate of £22,800 with the assumption of 25% offsite delivery and the unit price above gives an average annual cost of £11.6m, 2022 prices.

The onsite cost of delivering units is estimated to be £21,672 per hectare[33]. This is based on a joint RSPB, National Trust and Wildlife trusts study and the calculation is set out in full in Annex A. It is assumed this cost delivers the most distinctive habitat possible under the biodiversity unit metric guidance[34] and makes reasonable adjustment for time and is therefore equivalent to approx. 6.65 units per hectare. This is uncertain and could range from 3 units up to 10 (impact of this on value for money is covered in the sensitivity analysis).

NSIPs are typically rich in available space, to meet the requirement they need to deliver relatively few additional units per hectare. Compared to the baseline of what is currently being delivered the sites in the sample need to deliver an additional average 1.5 additional units per hectare to deliver 75% of net gain onsite[35]. Scaling the cost above to deliver an average of 1.5 units per hectare gives a cost of £4,395 per hectare. Combining all this information gives annual average cost of £3.3m in 2022 prices.

The cost of units to reach 10% BNG was calculated for each of the 24 projects with available data by combining the figures above. This was then scaled up (weighting for public/private sector difference between sample and population) to reflect the total number of NSIPs which

[27] Eftec, Biodiversity Net Gain: Market Analysis Study (2021), Appendix C, page 30

[28] A further 4% suggested 100% onsite delivery

[29] 22% said 0% to 25%, a further 4% suggest 0% onsite delivery

[30] https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12820

[31] Eftec, Biodiversity Net Gain: Market Analysis Study (2021), p18

[32] (£20,000 x 84%)+(£25,000 x 16%), uprated by GDP deflator and plus a markup of 10%

[33] https://nt.global.ssl.fastly.net/documents/assessing-the-costs-of-environmental-land-management-in-the-uk-final-report-dec-2017.pdf

[34] http://publications.naturalengland.org.uk/publication/6049804846366720

[35] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section. The amount of post development biodiversity was compared to the amount required to deliver 75% onsite.

had received consent (82 projects in total). This gives an annual average figure of £15m in 2022 prices.

Unit register (Public sector)

It is planned that there will be an online register to provide a central database for biodiversity units. This will be delivered regardless of whether the policy is extended to NSIPs and it is not expected that adding NSIPs would significantly affect the delivery costs. Therefore, it is assessed that there are not additional costs above the baseline.

Administrative time costs (public sector)

There may be additional marginal cost to government of overseeing the implementation of biodiversity net gain on NSIPs but it is assessed as being negligible and has therefore not been quantified in the analysis. The Planning **I**nspectorate are already expected to assess whether ecological consideration is adequate, and planning authorities are already tasked with enforcing landscaping and design permissions for development. This policy provides further clarification for that assessment and enforcement, but it is recognised that additional enforcement burdens may arise in some cases.

Benefits

Natural capital amenity value (population local to NSIP developments)

A natural capital approach has been used to assess benefits based on an approximation of the amenity value UK taxpayers will receive from greater biodiversity around NSIPs. "Amenity" loosely refers to a bundle of cultural services that arise to people from being close to natural assets, including aesthetic and visual benefits, tranquillity, and recreational opportunities.

Based on the NSIPs data[36], three out of twenty-four projects already met the net gain plus 10% threshold. Therefore, under the do-nothing an average of 1 project per year meets net gain and 6.5 do not. Ordinance Survey data[37] was used to map residences within 100m and 500m of the NSIPs not meeting net gain in the sample. This showed that there are on average 363 residences within 100m and 2,623 within 500m. The volume within 100m were removed from the 500m figure to avoid double counting. Combining the volumes with the amenity value of residing within the respective distances (£5,280 for 100m and £3,330 for 500m[38]) gave an average annual benefit of £62m once at steady state in 2022 prices.

For the first 5 years it is assumed no benefits are realised. From year 5 onwards 100% are realised. This is because the project lifecycles are quite long, and biodiversity takes time to grow. It however assessed that after 5 years habitat will have noticeably taken shape. Whilst habitats may not yet contain the full amount of biodiversity, they will have begun delivering the visual and audio benefits that are a major contribution to human consumption of natural capital.

The relationship between the benefit of living near a green space and the number of biodiversity unit in that space is not known. This makes adjusting benefits for the percentage of units

[36] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[37] Based on data gathered from development consent orders and Ordnance survey mapping, discussed in more detail under the methodology section

[38] https://www.ons.gov.uk/economy/environmentalaccounts/articles/valuinggreenspacesinurbanareas/ahedonicpriceapproachusingmachinelearningtechniques

delivered onsite or offsite difficult. This is an area for further research ahead of the final Impact Assessment.

It is assumed that the 25% of units delivered offsite will deliver a similar level of natural capital benefits to the local population. Whilst offsite units may be in less densely populated areas the metric requires greater delivery to compensate for this, therefore the net output should be the same in term of the value of biodiversity delivered. Offsite units may also be better joined up with other natural habitats and may also be in areas where people benefit from natural capital away from their place of residence. E.g. in an area of outstanding natural beauty, national parks or simply in the vicinity of countryside walks.

Wider Natural Capital Benefits (non-monetised)

Increased biodiversity will likely deliver a host of wider ecosystem services that are either intangible or hard to directly link to the policy intervention. These include benefits like contributions to flood management where the additional habitat soaks up rainwater instead of channelling it directly into sewers and rivers. Carbon sequestration will be delivered particularly in situation where additional diversity involves trees. Water quality will be improved where the biodiversity soaks up and either uses or filters pollutants such as nutrients.

Benefits to developers (not monetised)

Developers will benefit from certainty and a level playing field, resulting from a standardised approach to delivering biodiversity net gain across LPAs. The streamlining of the process could potentially result in savings for developers. A survey found that developers rate the overall complexity and associated costs of dealing with this as the most significant cause of extra cost in the planning process.[39] This is in addition to excessive and unpredictable delays. However, while consultation responses have supported this idea, there is little quantified evidence to robustly monetise these benefits.

Direct costs and benefits to business calculations

In the full list of 82 NSIPs, 65% of the developers were private[40]. Analysis of the sample data showed that the average costs of applying the policy in private projects is slightly higher. This difference is captured by directly analysing the 10 private projects in the sample and then scaled up to the 53 private projects in the full population. Using the same methodology as set out in the cost section above gave an annual average cost of £12m. Applying the methodology for assessing business impacts gives a BIT score of 44 and a EANDCB of £8.7m in 2020 prices.

Risks and assumptions

Assumptions

Assumption	Description
% of biodiversity delivered onsite	75%
Baseline projects achieving net gain	12.5%
Projects per year	8.2
Value to residences with 100m	£3,326
Value to residences within 500m	£5,281
Lag for benefits realisation	0% in YR 1-4, 100% YR 5 onwards

[39] https://www.fmb.org.uk/media/35090/fmb-house-builders-survey-2017.pdf

[40] This is from the same data set discussed under the data section at the start of the methodology section.

Cost of onsite units per hectare	£21,672
Cost of offsite units	£23,000
Number of units delivered onsite per hectare	6.65
Employees per firm requiring familiarisation	2
Days training required for familiarisation	1
Average cost of familiarisation	£17,980
Incomplete projects	Incomplete projects are assumed to match the habitat profiles of completed projects
Offsite units' location	Offsite units are assumed to be delivered within a neighbouring LPA

Sensitivity

A sensitivity analysis has been conducted to understand the impact of the assumptions made on the estimated NPV of £125m. All the assumptions set out above were tested the following assumptions have been selected as they have an impact above ± £10m on NPV.

Assumption	High (NPV impact)	Low (NPV impact)	High NPV impact	Low NPV impact
Onsite units per hectare delivered by £19,698	10	3	+£9m	-£30m
Offsite cost per unit	£15,000	£31,000	+£30m	-£30m
Lag for benefits realisation	No benefits realised until year 3 (2025/26)	No benefits realised until year 7 (2029/30)	+£100m	-£100m
Benefit within 500m	£3,826	£2,826	+£30m	-£30m
On site/Off site provision - costs	100% onsite	50% off site	+£82m	-£82m
On site/Off site provision - Benefits	As is (100% realisation)	25% of benefits not realised	£0	-£78m

The high and low figures above set out the impact of each assumption varying within a reasonable range. Combining the figures gives a high NPV of £371m and a low of -£216m[41].

The table above shows that key uncertainties are the balance between onsite and offsite delivery and the lag in benefits realisation.

The table also highlights that if developers follow the incentivisation of both relative costs and the metric to produce more units onsite then this significantly pushes up the NPV of the policy proposal. This represents a good alignment of public preferences with private incentives. Conversely if developers struggle to produce distinctive habitat onsite (lowering their unit per hectare score to 3) and they also end up delivering 50% offsite then this has a big impact on the NPV. This analysis also demonstrates that the policy does give developers way to minimise their costs. The more developers engage with the incentives of the policy by building biodiversity into their onsite plans the more cost effective it will be for them and the more benefits it will deliver for society as a whole.

[41] Note these exact figures are not reached by adding values in the table due to interaction between a number of the assumptions.

Risks

Key risks include:

Geographical differences in unit price – Geographical price differences could incentivise developers to deliver off-site units. For example, units in London may prove very expensive (although also very valuable to the local population). This may lead developers to consider on off-site option in a location with low land values and low biodiversity. This would create a skewed distribution of biodiversity across the country and potentially direct biodiversity away from locations in which people live and work. This is mitigated by the metric penalising offsite delivery. If developers acquire off-site beyond adjacent Local Planning Authorities, then have they to deliver significantly more biodiversity units.

Perverse incentives for landowners – Landowners are currently able to sell agricultural land at well above its agricultural value when it is apparent the land will be used for development. The biodiversity net gain policy puts downward pressure on this capital windfall as the land will be less valuable to developers if it has higher biodiversity. At an extreme this could lead to 'trashing' of land as is sometimes reported in current practice. A more general approach of landowners may be to neglect biodiversity and thereby increase its development value. The Environment Bill contains provisions to disincentivise this for development under the Town and Country Planning Act (by specifying that an earlier baseline should be used where recent degradation has occurred) and a similar mechanism is expected, subject to consultation to be applied for NSIPs. A move to future environmental land management schemes[42] may also help incentivise environmental stewardship and reduce the likelihood of this risk.

Conclusion

The table below sets out the costs and benefits of extending the biodiversity net gain policy to Nationally Significant Infrastructure projects. The most likely outcome is that this policy will deliver net positive impact to UK society (though the policy will apply only to projects in England). There is a large amount uncertainty in a number of the costing assumptions. Analysis of these shows they could result in a Net Present Value as high as £370m or as low as -£215m. The true lag on benefits realisation and the balance between offsite and onsite provision are particularly significant.

These ranges are however at the extreme end of what the policies true impact might be. There are also two additional non monetised factors that mean the true impact is likely to be in the upper half of this range and a negative impact on society unlikely. They are the balance of monetizable costs and benefits and time horizons.

Due to the nature of costs and benefits involved it has been much easier to monetise all the relevant costs whilst some benefits are too intangible to assess the direct impacts of. Despite this imbalance of monetised costs and benefits the central estimate still shows a clear positive impact.

The benefits of this policy are much longer term than the costs. It has been assessed that benefits don't begin until 5 years after the policy has been implemented. As a result of this and the impact of discounting, the benefits are unrepresented in the headline net present value calculation. If the time horizon is extended to 40 years, then the NPV goes up to £740m and the BCR to 3.3.

Taking these factors into consideration as well as the costs and benefits assessed above it is recommended that the policy is taken forward.

	Costs	Benefits	NPV
Monetised	Biodiversity Unit Costs £14m per year	Amenity value of green space close to residential addresses £62m per year	£126m (over ten years) £740m (over 40 years)

[42] https://www.gov.uk/government/publications/environmental-land-management-schemes-overview

	Familiarisation Costs £19,000 one off in year 1		
Non monetised	n/a	Wider benefits incl: Flood management, water quality, carbon sequestration	

Impact on small and micro businesses

Whilst the policy as it applies to NSIPs does not, subject to consultation and responses about exemptions, contain an exemption for small and micro business it is very unlikely to negatively affect them. The size and scale of NSIPs means that they are unlikely to be taken on by small and micro businesses.

Assessing the size of developers is difficult due to larger firms creating limited liability subsidiaries specifically to deliver a given NSIP. These often have less than 50 employees but are often joint ventures of much larger companies and have correspondingly large turnover. Therefore, they wouldn't meet a standard definition of small or micro business. In the list 82 NSIPs gathered for this analysis 50 were distinct private sector companies. Of these 50; 23 had more than 50 employees in their own right; 20 were subsidiaries or joint ventures of companies with more than 50 employees or turnover above £2 million; 1 had less than 50 employees but a turnover in the region of £2m. It was not possible to track down data on the remaining 6[43]. Based on this data it is considered unlikely that any of the developers would meet the criteria of small or micro businesses.

The policy may positively impact some smaller businesses by creating a market for biodiversity units. For example, small-scale rural farmers may be able to implement biodiversity measures on their land and sell the corresponding units to developers.

A summary of the potential trade implications of measure

There are not expected to be any trade impacts as a result of this measure.

Monitoring and Evaluation

The 2018 net gain consultation proposed that government would introduce monitoring of the quality of delivery on the ground and measures to help ensure that environmental, social and development outcomes are achieved. Many responses to that consultation were clear that robust monitoring, for an appropriate length of time, would be key to ensuring effective delivery of net gain[44].

Current practice on monitoring biodiversity gains is variable across development types and projects. In cases of best practice, biodiversity gains are transparently proposed and recorded, this enabled monitoring to some extent though it is rare that generic habitat compensation (i.e. compensation for habitats other than statutory protected sites or species) is subject to explicit monitoring requirements or guidance. They are, however, sometimes ambiguously proposed in terms of the mitigation's scale or specification which can make it difficult to determine whether the proposed mitigation has been delivered.

Since the 2018 consultation, work has begun in Natural England and Defra on developing a framework for evaluation and monitoring of biodiversity net gain. The current consultation sets

[43] Further work will be done to establish the size of the remaining 6 developers ahead of the final stage IA

[44] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/819823/net-gain-consult-sum-resp.pdf

out further proposals for how monitoring can be facilitated. This will likely include the use of data from:

1. A consistent biodiversity metric to capture baseline and proposed habitats
2. Standardised templates for biodiversity gain plans and monitoring reports to enable easier collation of information and lower reporting burdens
3. A register, or other record, of off-site biodiversity gains

The evaluation framework being developed will list the range of outcomes being assessed for biodiversity net gain and will consider appropriate metrics for these outcomes for NSIPs as well as development under the Town and Country Planning Act. Where possible, metric will be aligned with existing data sources and those introduced through digitisation of processes in the planning system.

Should evaluation reveal a strong case for modifying the policy on the base of one or more outcomes being compromised, the Environment Bill provisions, and wider policy allow for a wide range of modifications to the requirement itself, the associated processes, and the biodiversity metric (which will be subject to its own consultation next year).

ANNEX A: Onsite costs

The cost of delivering onsite habitat is a key variable in this impact assessment. The cost used in the assessment is derived from a joint RSPB, National Trust and Wildlife Trusts study[45].

The study estimates a need to restore 250,646 ha of priority habitat per year (see Table 4.1) at a cost of £250,376,000 per year (see Table 5.1) – giving a priority habitat restoration costs per hectare of c£1,000 per annum. The report also identifies a need to create 27,153 ha of priority habitat per year (see Table 4.1) at a cost of £31,036,000 (see Table 5.1) giving a priority habitat creation cost per hectare of c£1,150 per annum. The average of the two costs is £1,070 per year.

Discounting £1,070 of annual costs over 30 years gives a figure of £19,698. Uprating this from 2017 prices to 2022 gives a figure of £21,672 per hectare.

[45] https://nt.global.ssl.fastly.net/documents/assessing-the-costs-of-environmental-land-management-in-the-uk-final-report-dec-2017.pdf

Annex B: Further evidence on level of net gain and permanence

Two key policy components we tested at consultation concerned the level of net gain and permanence of habitat offsets. This annex sets out additional evidence and considerations for both policy components.

Level of net gain required

Two primary factors were considered in selecting a suitable level of net gain:

- the capability of the policy to deliver genuine gains for nature (and thereby give confidence of enhancement to communities in receipt of development) and any consequent social and economic benefits
- the capability of the development sector (and others) to meet the requirement without significantly affecting development rates or inhibiting sustainable economic growth

Sources of uncertainty in the delivery of compensation-based conservation policy include scientific sources, such as measurement error and narrow scope of measurements, and communicative sources such as under-specificity (because the metrics are highly simplified relative to the depth of ecological information that would be necessary for net gain in the strictest sense). Further process uncertainties include the risk of habitat degradation before application submission (i.e. baseline alteration), allowances for imperfect enforcement, the risk of insolvency of offset providers and/or developers, the risk of systematic undervaluation of habitats and wider (indirect) pressures of development on general biodiversity from light, sound, predation by pets and recreational use.

The time lags in between development and compensatory habitat reaching equivalent biodiversity are also significant. It can take centuries for some types of compensation habitats to acquire ecological communities that are equivalent to lost habitats across different measures of biodiversity[46]. This is not applicable to all compensation projects (it would likely be accelerated where part of the existing ecology is retained nearby to the compensation site) and is not practical in the design of compensation habitat within desirable development timeframes. Therefore, a more achievable multiplier is included in the biodiversity metric that relates to the creation timeframe of the habitat itself. The permanence of offsets (i.e. the expectation that not all compensation habitat will exist as long as the development it is compensating for, further discussed in the next section) represents another factor by which overall gains might be undermined in the medium to long term.

Compensation habitat creation undertaken through schemes around the world have been delivered with reported success rates that range from 0% (where success is defined as fully ecologically functioning habitats) to 74% in long-term established offsetting schemes[47]. Other studies have found lower success rates of between 6 and 20%[48]. It is therefore considered desirable, despite expectations that this policy will achieve higher success rates than those commonly reported in the literature (due to improving habitat creation understanding, risk multipliers in the metric and lessons from past experiences), to set a more ambitious requirement for net gain to increase the likelihood that development schemes will deliver net enhancement in aggregate, or at least prevent loss of biodiversity.

Setting a higher level also means that gains could be achieved with an imperfect level of scrutiny and monitoring of individual sites (and the costs that such extensive monitoring and enforcement would incur). The evidence on past habitat compensation success rates in the

[46] Curran, Hellweg and Beck, Is there any empirical support for biodiversity offset policy? Ecological Applications, Volume 24, 2014

[47] Bull et al., Biodiversity offsets in theory and practice. Oryx, Volume 47, 2013

[48] Maron et al., Faustian bargains? Restoration realities in the context of biodiversity offset policies. Biological Conservation, Volume 155, 2012

literature, and practical limitations on the intensity of monitoring and enforcement, suggest that a target rate above a nominal 1% gain would likely be appropriate to avoid net loss in biodiversity in practice.

In summary, there are a number of factors that make halting biodiversity loss through development an unlikely prospect with any level of gain which is close to 0% (e.g. 1%). The department therefore favours a high level of net gain in principle, though the available evidence does not identify any particular level of gain as uniquely suitable.

The analysis undertaken in this IA indicates that the level of requirement makes relatively modest difference to the costs of mitigating and compensating for impacts (see Section 6.11) when assessed against the more significant costs of achieving no net loss and wider development policy objectives. The majority of the costs associated with net gain are incurred to correct for the initial loss of biodiversity through development (i.e. achieving only 'no net loss'). When compensation for development's impacts is incorporated, a 10% net gain could be seen as a requirement to deliver approximately 110% of the total lost biodiversity (approximately because the 10% is applied to the full biodiversity value of the development site, rather than only those lost or in the structures' footprint). A 10% gain therefore represents a relatively small proportion of overall habitat creation/enhancement requirements.

Industry evidence from developers and LPAs implementing biodiversity net gain approaches suggest that the average gains achieved on developments vary widely, between a few percent and over 300%. Whilst very high gains are possible for some developments and the aforementioned evidence demonstrates the desirability of a very high rate, the level of gain selected for a mandatory requirement must be applicable (and therefore achievable) for all appropriate development in scope: a wide range of development types and sizes.

The planning authority for Lichfield District requires a net gain of 20% on new development (this is measured against gross units lost, rather than the full within-boundary baseline, but this will be similar for many schemes), and experience there to date suggests that developers are able to meet this requirement and often achieve much greater levels of biodiversity net gain. Evidence was received during consultation of several commercial sites aiming for net gains of 25% (though it is unclear what metric these schemes were using). Some other authorities in England are currently considering 5% net gain policies and some accept a marginal 1% gain. Advice to the department from some Natural Capital Committee members[49] suggests, in line with evidence from academic literature, that a level of net gain at, or ideally above, 10% is necessary to give reasonable confidence in halting development's role in biodiversity loss. Consultation responses more generally highlighted the fact that many existing industry commitments are based on rates of around 1%-5%; this does not prove that higher levels are unachievable, but gives the strongest sense of what is achievable even under the pre-existing policy-driven approach and without improved guidance, design and compensation markets.

In light of the advantages of a significant margin of gain, but also the need for a rate that can be mandated with confidence that it will not significantly affect the delivery of appropriate development, 10% was selected as a reasonable level of gain to consult on.

A 10% gain provides a small margin of gain to account for the outlined process, epistemic and linguistic uncertainties whilst operating within the parameters of established and successful net gain planning policies which are not thought to significantly affect development rates or viability. In simple terms, it is the most achievable level of net gain that the department could confidently expect to deliver genuine net gain, or at least no net loss, for biodiversity and thereby meet its policy objectives.

[49] Pers. comm. 2018

Consultation responses were mixed with regard to this rate: development stakeholders typically (but not unanimously) asked for a lower rate, whilst several environmental NGOs requested that a higher level of gain should be set to be confident of real net benefits for wildlife. Some respondents acknowledged that the rate would need to be set somewhere initially, and that monitoring and evaluation would be necessary to identify an optimal rate in the future.

Permanence

Developments typically remove some habitats permanently. If offset habitats are established temporarily, with no guarantee that they will be retained beyond a fixed period, the result will be a net loss of habitat. This could also be true if a habitat is protected for a second fixed term by offsetting from a second development elsewhere (though protection in itself would not be considered eligible as compensation). This is because over time, a single hectare of offset habitat would have been used to offset multiple hectares of lost habitat elsewhere. A discussion of the issue in the evaluation of the biodiversity offsetting pilots illustrates that there is a current lack of guidance. The pilots prepared management plans of 25-30 years in the absence of guidance on the meaning of 'in perpetuity' for offset sites[50]. We will provide clarity on this issue, and will also develop guidance or policy that address the risk of compensation sites being 'recycled' after 25-30 years to offer compensation to more than one development.

We have so far assumed that developer responsibility for management is time-bounded to 30 years (though in practice this responsibility is often passed on earlier to the agency contracted by the developer to create and manage compensation habitat). But permanence of land use change, with another entity responsible for long-term management, is being considered. International evidence shows that an existing policy in France requires offsetting for as long as the impacts occur. Options to achieve this include giving land to a Public Land Trust or designating land as a protected area[51]. The U.S.A and Australia[52] also mandate offsets which last either as long as the development itself, or for perpetuity. It should be clarified that whilst management obligations are unlikely to extend beyond 30 years in most cases, it is not expected or intended that compensation habitat will subsequently be removed or be stripped of any acquired protections after this timeframe expires.

Concerns over perpetuity have centred on deliverability and the willingness of landowners to enter into long term stewardship agreements. The solutions most commonly seen are to purchase land, with a conservation non-governmental organisations (NGO) or local authority assuming responsibility for long-term management, or habitat banking using unproductive or marginal land offered by landowners who are happy to keep newly created habitat indefinitely. Conservation covenants might also facilitate longer term delivery and reduce the cost of setting management agreements. We are exploring the impact that a requirement or incentive for longer term delivery through conservation covenants would have on deliverability.

[50] http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18229

[51] http://bbop.forest-trends.org/documents/files/frances_new_biodiversity_law_and_implications_for_no_net_loss_of_biodiveristy.pdf

[52] https://www.ncbi.nlm.nih.gov/pubmed/19924472