Case Study 1: Residential development

The Statutory Biodiversity Metric Calculation Tool

This case study demonstrates how using the statutory biodiversity metric calculation tool can inform the design and layout of a residential development to achieve and evidence biodiversity net gain.

This document complements statutory biodiversity metric guidance and may be useful for biodiversity metric tool users such as ecologists, residential developers and those reviewing similar projects.

Overview

This case study is based on a hypothetical expansion of a medium-sized residential area. It shows how the statutory biodiversity metric calculation tool (hereafter referred to as 'the biodiversity metric tool') can be used to calculate changes in 'area habitat biodiversity units' and 'hedgerow biodiversity units' associated with on-site and off-site habitat loss, creation, and enhancement, to determine whether a biodiversity net gain has been achieved.

This case study shows the benefits of using the biodiversity metric tool when initially planning the layout of a development, as it can be used to inform decisions around habitat retention, creation, and enhancement.

Guidance on the full biodiversity net gain process can be found on the GOV.UK website.

This case study demonstrates:

- The use of the biodiversity metric tool to calculate changes in 'area habitat biodiversity units' and 'hedgerow biodiversity units'.
- The use of the biodiversity metric tool to inform a project's design choices.
- The use of off-site habitat creation and enhancement and the spatial risk multiplier in the biodiversity metric tool.
- The application of the 70:30 ratio of 'developed land, sealed surface' to 'vegetated garden' within the biodiversity metric tool when assessing habitats within areas outlined for housing.

The site

This case study covers a hypothetical residential development at the edge of a town in north-west England, which is hereafter referred to as 'the proposed development'. All land within the red line project boundary of the proposed development classes as 'on-site'.

When mapped using UK Habitat Classification (UKHab) according to the statutory biodiversity metric User Guide, the habitats on-site are mostly 'modified grassland', with areas of 'bramble scrub' and 'other neutral grassland'. There are plantations of 'other woodland; broadleaved' located to the north and east of the site, with some 'species-rich native hedgerows' and 'lines of trees' forming the field boundaries in the south and west. This case study does not include any watercourse habitats, but these would need recording in the biodiversity metric tool if a watercourse or its riparian zone was present within the project boundary.

Key biodiversity metric tool information

Key elements of the statutory biodiversity metric guidance and biodiversity net gain guidance relevant for this case study are highlighted below, but the full guidance should be referred to for more information.

The biodiversity metric tool uses habitat data input into it to calculate the pre-development 'baseline' biodiversity units for a site, and calculates the net changes in biodiversity units as a result of habitat loss, creation and enhancement which may result from a development. The three types of biodiversity unit for area habitats, hedgerows and watercourses are treated separately, and the biodiversity metric tool calculates whether a net gain has been achieved in each.

In this case study, only 'area habitat biodiversity units' and 'hedgerow biodiversity units' are present at baseline, therefore a minimum of 10% biodiversity net gain is required for both types of biodiversity unit.

Trading rules

In a project aiming to achieve biodiversity net gain, the trading rules of the biodiversity metric tool need to be met, in order to ensure that any habitat losses are compensated for with an appropriate habitat type. The trading rules are based on habitat 'distinctiveness' – which directly relates to habitat type and broad habitat.

Biodiversity gain hierarchy

The biodiversity gain hierarchy should be followed as part of the biodiversity net gain process, prioritising on-site retention of medium and higher distinctiveness habitats and enhancing and creating habitat on-site before considering off-site options or statutory credits. More information can be found on the GOV.UK guidance.

Spatial risk multiplier

When off-site habitat interventions are being used, the location of the off-site land chosen is important because the biodiversity metric tool has a 'spatial risk multiplier' which varies based on the proximity of the off-site location to on-site. More biodiversity units are generated when the off-site location within the same Local Planning Authority or National Character Area.

Approach to biodiversity net gain assessment

This case study presents two scenarios with different approaches and site designs for the same development, which a developer is exploring prior to submitting a planning application:

- Scenario 1: The biodiversity metric tool is not used at the design stage and off-site habitat creation and enhancement is required to achieve biodiversity net gain.
- Scenario 2: The biodiversity metric tool is used early in the design process to guide the location of housing, enabling a biodiversity net gain to be achieved using on-site land only.

Assumptions

The following assumptions apply to both scenarios:

Habitats

- Approximately two thirds of the site will be developed into houses, gardens, roads, and shops. Approximately one third will be retained as open space and 0.1 ha of green roof will be created.
- Because the exact proportion of developed land to gardens is not known, the standard 70:30 ratio has been used for post-development, as advised in the User Guide.

- 0.05 km of ‘species-rich native hedgerow’ will be enhanced. All other hedgerow and ‘lines of trees’ habitats will be lost. The lost hedgerows will be replaced with the creation of new hedgerows and lines of trees around the perimeter of the development.
- No habitats are to be created in advance, or delayed a year or more after impacts.
- The target post-intervention condition of the proposed habitats will be reached. In practice this would require monitoring and oversight using ecological expertise to ensure it is achieved.

The biodiversity metric tool multipliers

- In this case study, the site is not covered by a Local Nature Recovery Strategy (LNRS) yet, so strategic significance has been assigned based on documents specified by the Local Authority. In this case, woodland, hedgerows and ‘lines of trees' within the site are of high strategic significance as they are mapped as locally ecologically important within this location in the Local Plan. All other habitats present at the site are of low strategic significance.

Baseline biodiversity units

Using the biodiversity metric tool, the biodiversity value of the on-site baseline is 12.11 area habitat biodiversity units and 1.91 hedgerow biodiversity units in both scenarios, as shown in Tables 1 and 2. Any expected biodiversity unit losses and gains are measured against this baseline.

Table 1. Number of biodiversity units for area habitats on-site at baseline.

Habitat type	Area (ha)	Habitat Distinctiveness	Habitat Condition	Strategic Significance	Baseline biodiversity units
Modified grassland	2.6	Low	Poor	Low	5.20
Other woodland; broadleaved	0.53	Medium	Poor	High	2.44
Other neutral grassland	0.52	Medium	Poor	Low	2.08
Other woodland; broadleaved	0.19	Medium	Moderate	High	1.75
Bramble scrub	0.16	Medium	Condition Assessment N/A	Low	0.64
Total	4 ha	-	-	-	12.11

Table 2. Number of biodiversity units for hedgerows on-site at baseline.

Habitat type	Length (km)	Habitat Distinctiveness	Habitat Condition	Strategic Significance	Baseline biodiversity units
Species-rich native hedgerow	0.14	Medium	Moderate	High	1.29
Species-rich native hedgerow with trees	0.04	High	Moderate	High	0.55
Line of trees	0.01	Low	Good	High	0.07
Totals	0.19	-	-	-	1.91

Note: All habitat data presented in the tables of this case study are generated directly from the statutory biodiversity metric calculation tool. All photos are for illustrative purposes only and were not taken in relation to this case study.

Post-development biodiversity units

Scenario 1: The biodiversity metric tool is not used in the design process, and off-site habitat would be required to achieve biodiversity net gain.

In this scenario, the biodiversity metric tool is not used to inform the on-site design. As such the development does not avoid higher distinctiveness habitats on-site and the proposal would result in a biodiversity net loss. The development would not be in line with the principles of the mitigation hierarchy and would not be able to demonstrate how the Biodiversity Gain Hierarchy had been applied at biodiversity gain plan stage. Losses and gains of area habitat biodiversity units are summarised in Table 3 below, and losses and gains of hedgerow biodiversity units are shown in Table 4 below.

In Scenario 1, the placement of the 'developed land' and 'vegetated gardens' will result in the loss of all the medium distinctiveness habitats present at baseline, aside from 0.53 ha of 'other broadleaved woodland' which will be enhanced by improving its condition. A portion of the low distinctiveness 'modified grassland' will also be enhanced through condition improvement. A 0.1 ha 'intensive green roof' will be created and incorporated into the development. Despite these interventions, Scenario 1 proposals result in an on-site biodiversity net loss of 3.33 area habitat biodiversity units, or a 27.55% net loss.

The majority of hedgerows and 'lines of trees' will also be lost, with only 0.05 km of 'species-rich native hedgerow' being enhanced. However, the creation of new boundary hedgerows and 'lines of trees' around the perimeter of the proposed development results in an overall on-site net gain of 0.24 hedgerow biodiversity units, or a 12.62% net gain.

This site layout does not allow the biodiversity net gain requirement to be met on-site for area habitats, or meet the trading rules for medium distinctiveness woodland, scrub, or grassland habitats. Therefore, it is necessary to identify a suitable off-site location where habitat could be created or enhanced.

As off-site habitat creation or enhancement is required, the suitability of various plots of land close to the proposed development are assessed, and an area of 'modified grassland' is chosen which is located within the same Local Planning Authority as the development. This 1.2 ha area of low distinctiveness 'modified grassland' had previously been utilised for open cast coal mining, and in recent years had been capped and restored for use as pasture, and it is considered to be suitable for enhancement to 'other neutral grassland'. The additional creation of 'other woodland; broadleaved' and 'mixed scrub' are also proposed for this location. These habitats are delivered and maintained for a minimum of 30 years in an agreement with the landowner.

Because the off-site location is within the same Local Planning Authority as the on-site location, the spatial risk category *'Compensation inside LPA boundary or NCA of impact site'* is selected in the biodiversity metric tool, so that the metric tool accounts for the proximity of the habitat interventions to the on-site location of impact.

Overall, the combination of on-site and off-site habitat creation and enhancement meets the trading rules and delivers a net gain of 1.43 area habitat biodiversity units, which is a 11.83% uplift; and a net gain in 0.24 hedgerow biodiversity units, which is a 12.62% uplift.

Table 3. Scenario 1 - Losses and gains in area habitat biodiversity units

Description	Area habitat biodiversity units
On-site baseline	12.11
<u>On-site enhancement and creation of area habitats</u> Habitat enhancement: • 0.53 ha of 'other woodland; broadleaved' from poor to moderate condition, of high strategic significance • 0.77 ha 'modified grassland' from poor to moderate condition, of low strategic significance Habitat creation – all low strategic significance: • 0.78 ha of 'vegetated gardens' – 'Condition Assessment N/A' • 1.82 ha of 'developed land; sealed surface' – condition 'N/A – Other' • 0.1 ha 'intensive green roof' in good condition	8.77
Net change in on-site area habitat biodiversity units	-3.33
Off-site baseline area habitat biodiversity units	2.40
<u>Off-site enhancement and creation of area habitats</u> Habitat enhancement – all low strategic significance: • 0.7 ha of 'modified grassland' in poor condition to 'other neutral grassland' in moderate condition Habitat creation: • 0.4 ha of 'other woodland; broadleaved' in moderate condition, of high strategic significance • 0.1 ha of 'mixed scrub' in moderate condition, of low strategic significance	7.17
Net change in off-site area habitat biodiversity units	+4.77
Total net gain in area habitat biodiversity units	+1.43
Overall percentage net change in area habitat biodiversity units	+11.83%

Table 4. Scenario 1 – Losses and gains in hedgerow biodiversity units

Description	Hedgerow biodiversity units
On-site baseline	1.91
<u>On-site created and enhanced hedgerow habitats – all high strategic significance</u> Hedgerow enhancement: • 0.05 km of 'species-rich native hedgerow' enhanced to good condition Hedgerow creation: • 0.07 km of 'species-rich native hedgerow with trees' in good condition • 0.08 km of 'species-rich native hedgerow' in good condition • 0.02 km 'line of trees' in moderate condition	2.15
Total net gain in hedgerow biodiversity units	+0.24
Overall percentage net change in hedgerow biodiversity units	+12.62%

Credit Natural England/Emily Martindale

Scenario 2: The biodiversity metric tool is used early in the design process, allowing biodiversity net gain to be achieved on-site.

In this scenario, information on the habitats present and biodiversity metric tool outputs are used to aid decision-making early in the design process. These are used to inform the site design in a way that enables delivery of the proposed development whilst meeting biodiversity net gain requirements. This is achieved by focussing the development on the 'modified grassland' because it is a low distinctiveness habitat, thereby avoiding losses of woodland, scrub and 'other neutral grassland' habitats which are of medium distinctiveness. The initial loss of area habitat biodiversity units is therefore reduced by avoiding habitats of medium distinctiveness.

As a result, it is possible to offset any losses in area habitat biodiversity units, and achieve an additional biodiversity net gain, by enhancing the existing medium distinctiveness habitats on-site by condition, as well as by creating 0.1 ha of 'intensive green roof'. These habitats are secured through ongoing management, with areas set out for recreation and others fenced for wildlife.

In this scenario, hedgerow habitats are treated the same as in Scenario 1, so it is possible to achieve the required net gain in hedgerow biodiversity units on-site.

Overall, the size of the development footprint remains at 2.7 ha, while the project meets trading rules, and achieves a net gain of 1.59 area habitat biodiversity units, which is a 13.15% increase; and a net gain of 0.24 hedgerow biodiversity units, which is an 12.62% increase.

Losses and gains in biodiversity units in Scenario 2 are summarised in Table 5 and 6 below.

Table 5. Scenario 2 – Losses and gains in area habitat biodiversity units

Description	Area habitat biodiversity units
On-site baseline	12.11
<u>On-site enhancement and creation of area habitats</u> Habitat enhancement: • 0.42 ha of 'other neutral grassland' from poor to good condition, low strategic significance • 0.16 ha of 'bramble scrub' to 'mixed scrub' in good condition, low strategic significance • 0.19 ha of 'other woodland; broadleaved' from moderate to good condition, high strategic significance • 0.53 ha of 'other woodland; broadleaved' from poor to moderate condition, high strategic significance Habitat creation – all low strategic significance: • 0.78 ha of 'vegetated gardens' – 'Condition Assessment N/A' • 1.82 ha of 'developed land; sealed surface' – condition 'N/A-Other' • 0.1 ha 'intensive green roof' in good condition	13.70

Description	Area habitat biodiversity units
Net change in on-site area habitat biodiversity units	+1.59
Off-site baseline area habitat biodiversity units	+13.15%

Table 6. Scenario 2 – Losses and gains in hedgerow biodiversity units

Description	Hedgerow biodiversity units
On-site baseline	1.91
On-site hedgerow creation and enhancement – all high strategic significance Hedgerow enhancement • 0.05 km of 'species-rich native hedgerow' enhanced to good condition Hedgerow creation: • 0.07 km of 'species-rich native hedgerow with trees' in good condition • 0.08 km of 'species-rich native hedgerow' in good condition • 0.02 km 'line of trees' in moderate condition	2.15
Total net gain in hedgerow biodiversity units	+0.24
Overall percentage net change in hedgerow biodiversity units	+12.62%

Conclusions

This case study highlights the importance of using the statutory biodiversity metric calculation tool early in the design process to consider habitats present and inform the layout of a development. In Scenario 1, the biodiversity metric tool is not used at the design stage, and 1.2 ha of additional off-site land is required for habitat creation and enhancement to achieve a minimum 10% net gain in biodiversity units.

However, in Scenario 2, the biodiversity metric tool is used early in the process to inform discussions and careful designing of the development to avoid any losses of medium distinctiveness habitats. This is in line with the principles of the mitigation hierarchy and means the developer can evidence how they have followed the biodiversity gain hierarchy when submitting their Biodiversity Gain Plan. The initial loss of area habitat biodiversity units is lower than in Scenario 1. As a result, it is possible to meet the trading rules and achieve a biodiversity net gain on-site by enhancing medium distinctiveness habitats on-site, as well as creating a green roof as part of the development.

By taking the approach set out in Scenario 2, the additional costs to the developer in Scenario 1 associated with securing the off-site land and management of off-site habitats over 30 years can be avoided, and the development contains better provision of on-site habitats for wildlife and people.

Key messages and top tips

- Application of the statutory biodiversity metric calculation tool early in the process of development projects can inform an iterative design process and may enable biodiversity net gain targets to be met through more cost-effective mechanisms, such as through avoiding the need to create or enhance habitats at off-site locations.
- When the exact proportions of developed land to gardens is not known in a proposed development, a 70:30 ratio can be used to calculate the area of each respectively. The exact area of habitats should be used where possible.
- Where it is necessary to create or enhance habitats off-site, it is important to consider the baseline biodiversity value of that site and propose habitat interventions that are appropriate for the site, using ecological expertise. This will both maximise the gains in biodiversity units and avoid unintended loss or degradation of habitats with high biodiversity potential.

- The location of any off-site habitat creation or enhancement should be situated as close to the on-site impacts as possible. The biodiversity metric tool promotes the use of land that is close to the on-site location, and this is reflected in the biodiversity units generated through the spatial risk multiplier.
- Area habitats and hedgerows are treated separately in the biodiversity metric tool, and cannot be summed, traded or converted. It is necessary to meet the trading rules and achieve the required biodiversity net gain in both area habitat biodiversity units and hedgerow biodiversity units, where these habitats are present in the baseline.

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