Case Study 3: River restoration

The Statutory Biodiversity Metric Calculation Tool

This case study demonstrates how the statutory biodiversity metric calculation tool can calculate changes in biodiversity units and overall biodiversity net gain associated with a river restoration scheme.

This document complements statutory biodiversity metric guidance and may be useful for users and reviewers of the biodiversity metric tool, when it is used for river restoration projects aiming to achieve biodiversity net gain as part of planning permission or voluntarily.

Overview

This case study is based on a hypothetical river restoration scheme undertaken in London where a river and associated river corridor habitats are enhanced, resulting in a biodiversity net gain. This is achieved despite some grassland loss, as the remaining grassland is enhanced, and the watercourse is also enhanced by condition, increasing its length through re-meandering.

This case study 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 'watercourse biodiversity units' associated with habitat loss, creation, and enhancement, to determine whether a biodiversity net gain has been achieved.

Guidance on the full biodiversity net gain process can be found on the GOV.UK website. This case study does not cover other requirements or processes associated with river restoration.

This case study demonstrates:

- The use of the biodiversity metric tool to calculate changes in watercourse biodiversity units and area habitat biodiversity units.
- How to account for increases in the length of a watercourse channel resulting from river restoration that reinstates meanders, as well as the consideration of watercourse and riparian encroachment.
- How to account for losses of area habitat biodiversity units resulting from the creation or restoration of river habitats.

The site

This case study describes a hypothetical river restoration scheme that is part of the wider renovation of a large London park within a highly urbanised residential area. The scheme will have multiple benefits including improving flood alleviation, biodiversity, and adaptation to climate change within an urban environment.

The scheme works include removing concrete structures along the watercourse, creating a natural riverbed, restoring a more sinuous river channel through existing grassland habitat, and creating an area of wet grassland habitat along the route of the original river channel by enhancing some of the existing grassland habitat.

Key biodiversity metric 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 inputs to calculate the pre-intervention '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 cannot be summed, traded or converted. The biodiversity metric tool calculates whether a net gain has been achieved in each.

In this case study, only watercourse biodiversity units and area habitat biodiversity units are present at baseline, therefore a minimum of 10% biodiversity net gain is required for those 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.

Watercourse and riparian encroachment

A project which contains watercourse habitats needs to consider watercourse and riparian encroachment at baseline and post-intervention, as defined below:

- Watercourse encroachment - any feature that adversely affects the natural function of the watercourse, or results in localised changes in habitat, species and migratory pathways. For example weirs and engineered bank revetments.
- Riparian encroachment - any feature or intervention within the riparian zone (a set distance from the bank top based on watercourse type) that reduces the quantity, quality or ecological function of the riparian habitat. For example, new buildings or structures.

Approach to biodiversity net gain assessment

In accordance with the statutory biodiversity metric User Guide, the site is surveyed by a competent person (who has completed River Condition Assessment training therefore is accredited), with watercourse habitats classified using the statutory biodiversity metric guidance, and area habitats using ukhab – UK Habitat Classification. This competent, accredited person also carries out the River Condition Assessment, and additional attributes required to fill out the biodiversity metric tool are collected including habitat condition, strategic significance, and watercourse and riparian encroachment.

Assumptions

This case study contains the following assumptions:

Habitats

- The target post-intervention conditions of the proposed habitats are expected to be reached. In practice this would require monitoring and oversight using ecological expertise to ensure it is achieved.
- No habitats are to be created in advance, or delayed a year or more after impacts.

Biodiversity metric tool multipliers

- As the site is not covered by a Local Nature Recovery Strategy (LNRS) yet, documents specified by the Local Authority are used to determine strategic significance. For simplicity, it is assumed that no habitats present at baseline or post-intervention are included as priorities within specified local documents, so all habitats are set at low strategic significance in the metric tool.
- There are no activities causing riparian encroachment into the riparian zone at baseline or post-intervention.

Pre-intervention baseline biodiversity units

At baseline, the on-site area habitats comprise 2.71 ha of 'modified grassland' in poor condition; and the watercourse habitats comprise 0.5 km of 'other rivers and streams' habitat in 'fairly poor' condition (as justified by the competent person), and 0.1 km of 'other rivers and streams' habitat in poor condition. The 0.5 km stretch of watercourse has no watercourse encroachment, but there is major watercourse encroachment along the 0.1 km reach as there are concrete structures present along the watercourse.

Using the biodiversity metric tool, the habitats present at baseline yield 5.42 area habitat biodiversity units and 4.80 watercourse biodiversity units, as shown in Table 1 and Table 2, respectively. Any biodiversity unit losses and gains are measured against this baseline.

Table 1. Baseline area habitat values

Habitat type	Area (ha)	Habitat Distinctiveness	Habitat Condition	Strategic Significance	Biodiversity units
Modified grassland	2.71	Low	Poor	Low	5.42
Total	2.71	-	-	-	5.42

Table 2. Baseline watercourse values

Habitat type	Length (km)	Habitat Distinctive-ness	Habitat Condition	Strategic Significance	Encroach-ment	Biodiv-ersity Units
Other rivers and streams	0.4	High	Fairly poor	Low	None	3.60
Other rivers and streams	0.1	High	Fairly poor	Low	None	0.90
Other rivers and streams	0.1	High	Poor	Low	'Major' Watercourse encroachment	0.30
Total	0.6	-	-	-	-	4.80

Post-intervention biodiversity units

Area habitat biodiversity units and watercourse biodiversity units are considered separately within the biodiversity metric tool and cannot be summed, traded, or converted.

In this case study, the restoration of a meandering river channel increases the length of watercourse habitat, which impacts on the surrounding area habitats. Within the biodiversity metric tool, this scenario should be approached as set out below.

Watercourse biodiversity unit calculation

Following river restoration, the total length of the watercourse habitat increases from 0.6 km to 0.8 km due to the meandering shape of the restored channel. This additional 0.2 km of watercourse habitat can be entered in the biodiversity metric tool as ‘enhancement’ by recording the post-restoration length in the ‘Length enhanced’ column in the ‘On-Site WaterC’ baseline’ sheet. This is then automatically carried forward to the ‘On-Site WaterC’ enhancement’ sheet.

A ‘Check Lengths’ warning message may be generated, and the ‘User comments’ column should be used to explain why the baseline and post-intervention lengths are not the same, as shown in Figure 1.

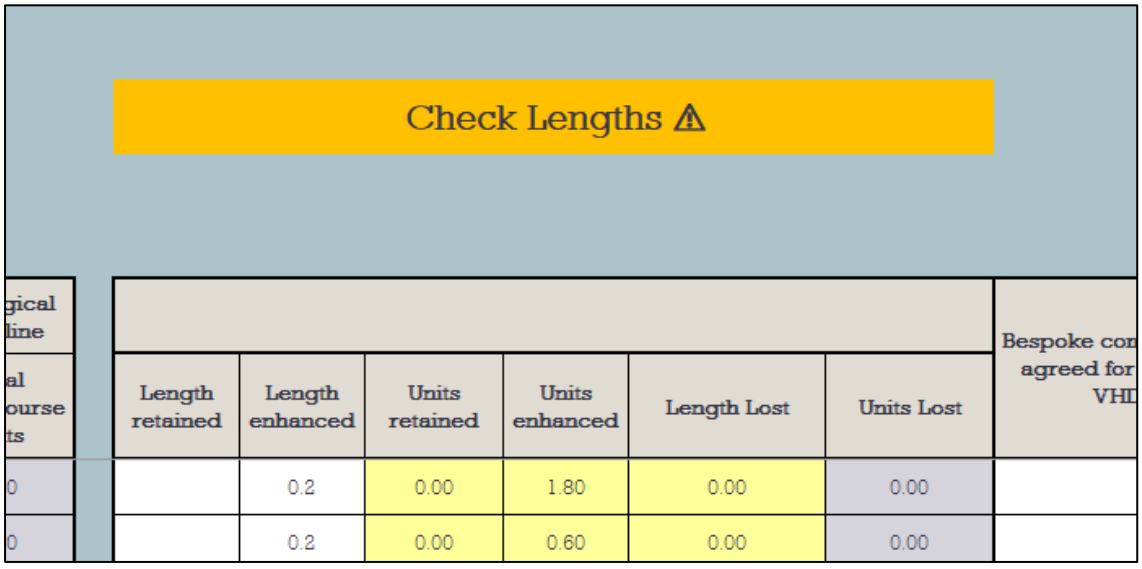

Figure 1. Screenshot of the biodiversity metric tool watercourse baseline tab.

In this case study, the enhancement of 0.1 km of ‘other rivers and streams’ habitat from fairly poor condition, to 0.2 km in moderate condition yields 1.84 watercourse biodiversity units.

Similarly, enhancement of 0.1 km of ‘other rivers and streams’ habitat in poor condition to 0.2 km of ‘other rivers and streams’ habitat in moderate condition, and with the major encroachment removed, yields 1.65 watercourse biodiversity units.

The retention of a further 0.4 km of ‘other rivers and streams’ habitat in fairly poor condition also contributes 3.60 watercourse biodiversity units to the post-intervention outputs.

Altogether, this gives a total value for enhanced and retained watercourse habitats of 7.08 watercourse biodiversity units, which results in a net gain of 2.828 watercourse biodiversity units, and a 47.54% net increase. Losses and gains of watercourse biodiversity units are summarised in Table 2 below.

Area habitat biodiversity unit calculation

The restoration of a more meandering river channel results in the loss of 0.37 ha of 'modified grassland' equating to 0.74 area habitat biodiversity units. In its place, the watercourse is recorded as created 'watercourse footprint' in the biodiversity metric tool, yielding 0 area habitat biodiversity units.

A warning message may be generated, as shown below in Figure 2, which prompts the user to ensure all watercourse details are included in the watercourse tab as well as using 'watercourse footprint'.

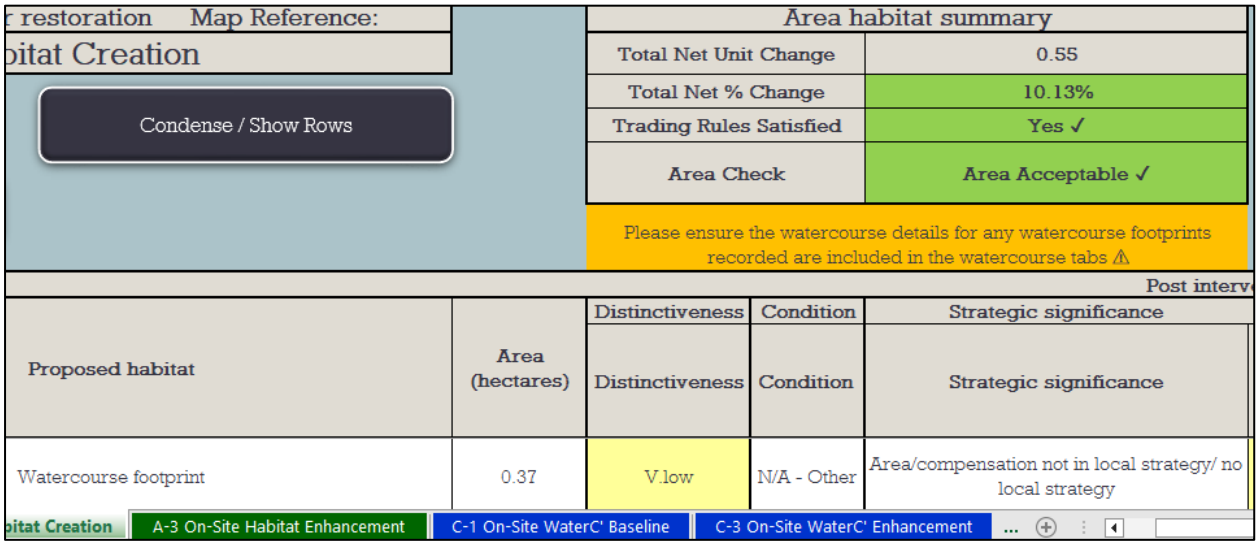

Figure 2. Screenshot of the biodiversity metric tool area habitat creation tab.

The grassland loss is mitigated through the enhancement of 0.22 ha of the remaining 'modified grassland' to good condition wet grassland habitat, classified as 'other neutral grassland' in UK Habitat Classification, yielding an additional 1.73 area habitat biodiversity units.

The remaining 2.12 ha of 'modified grassland' habitat is retained, giving an overall net gain of 0.55 area habitat biodiversity units, which is a 10.13% net gain, despite the associated loss in grassland area. Losses and gains of area habitat biodiversity units are also summarised in Table 3.

Table 3. Losses and gains in on-site area habitat biodiversity units

Description	Area habitat biodiversity units
Baseline – 2.71 ha 'modified grassland', poor condition	5.42
Habitat retention and enhancement: • 2.12 ha 'modified grassland', poor condition retained • 0.22 ha 'modified grassland' in poor condition enhanced to 'other neutral grassland' in good condition	+5.97
Habitat creation: • 0.37ha 'watercourse footprint'	+0.00
Net change in area habitat biodiversity units	+0.55
Total net gain in area habitat biodiversity units	10.13%

Table 4. Losses and gains in on-site watercourse biodiversity units

Description	Watercourse biodiversity units
Baseline – 'other rivers and streams' habitat: • 0.5 km fairly poor, condition, no encroachment • 0.1 km poor condition, major watercourse encroachment	4.80
Habitat retention: • 0.4 km 'other rivers and streams' in fairly poor condition with no encroachment	3.60
Habitat enhancement: • 0.1 km 'other rivers and streams' in fairly poor condition to 0.2 km 'other rivers and streams' in moderate condition, no encroachment • 0.1 km 'other rivers and streams' in poor condition to 0.2 km 'other rivers and streams' in moderate condition, and removal of the major watercourse encroachment	+1.84 +1.65
Net change in watercourse biodiversity units	+2.28
Total net gain in watercourse biodiversity units	+47.54%

Conclusions

This case study demonstrates the use of the statutory biodiversity metric calculation tool in river restoration projects to recognise the additional biodiversity value resulting from the increase in watercourse length and improvement to watercourse habitat condition when it is restored to have a more meandering channel.

When undertaking river restoration, the competent person using the biodiversity metric tool should also consider any changes in area habitats. Where restored channels result in a loss of area habitats, these can be addressed through the enhancement of remaining area habitats, or creation of additional habitat.

In this case study, there is a net gain in both watercourse biodiversity units and area habitat biodiversity units, despite the loss of a small amount of area habitat.

Key messages and top tips

- Area habitats and watercourse habitats are treated separately in the statutory biodiversity metric calculation tool, meaning that a minimum 10% net gain is required for both, where both types are present at baseline. Area habitats, measured in hectares, generate area habitat biodiversity units, and watercourse habitats, measured in kilometres, generate watercourse biodiversity units. These units are unique and cannot be summed, traded, or converted.
- Where ‘watercourse footprint’ is used in the area habitat tabs of the biodiversity metric tool, attributes of the watercourse also need to be recorded in the watercourse tabs.
- Re-meandering or restoring a river may result in a longer length at post-intervention. This can be recorded in the watercourse baseline tab, and an explanation given in the ‘User comments’ box.
- Fairly good and fairly poor condition categories should only be used by the competent person where there is robust ecological reasoning and justification given.
- Developers could consider enhancing and/or creating area habitats to replace the losses in area habitat biodiversity units resulting from restoring the river channels.
- The removal of artificial structures encroaching either into the channel or the riparian zone counts as ‘enhancement’ and can be recorded as such, generating additional watercourse biodiversity units.

Acknowledgements

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