

Biodiversity metric 4 case study 3: River restoration

This case study demonstrates how biodiversity metric 4 can calculate changes in biodiversity units associated with a river restoration scheme.

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.

This scheme results in a loss of grassland habitat and a gain in the length and condition of watercourse habitat. This achieves a biodiversity net gain through improvements to the watercourse habitat and enhancement to the condition of the remaining grassland habitat.

This case study demonstrates:

- ✓ The use of biodiversity metric 4 to calculate changes in 'watercourse biodiversity units' and 'area habitat biodiversity units'.
- ✓ How to account for increases in the length of the river channel resulting from river restoration by reinstating meanders.
- ✓ How to account for losses of area habitat biodiversity units resulting from the creation or restoration of river habitats.

Note: All habitat data presented in the tables of this case study are taken directly from biodiversity metric 4.

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 storage, 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.

Approach to biodiversity net gain assessment

To calculate the watercourse biodiversity units of watercourse habitats, biodiversity metric 4 requires data inputs including watercourse habitat type, length, condition, strategic significance, and level of watercourse and riparian encroachment.

The watercourse biodiversity units are used to quantify losses and gains of watercourse habitats and cannot be offset by creation or enhancement of area habitat biodiversity units or hedgerow biodiversity units.

Assumptions

The following assumptions apply to this case study:

- The on-site baseline watercourse habitats are of high strategic significance as they are part of a Local Nature Recovery Scheme.
- There is no encroachment into the riparian zone at both pre- and post-intervention.
- No habitats are to be created in advance or delayed after impacts occur.

Pre-development baseline biodiversity units

At baseline, the project boundary contains 0.5 km of 'other rivers and streams' habitat in fairly poor condition, and 0.1 km of 'other rivers and streams' habitat in poor condition. There is major watercourse encroachment along a 0.1 km reach, and no watercourse encroachment along a 0.5 km reach. There is also 2.71 ha of 'modified grassland' in poor condition.

Using biodiversity metric 4, the watercourse habitats present at baseline yield 5.42 area habitat biodiversity units and 5.52 watercourse biodiversity units, as shown in Table 1. Any biodiversity unit losses and gains are measured against this baseline.

Table 1. Number of biodiversity units for area and watercourse habitats within the site at baseline.

Habitat type	Area (ha) / length (km)	Habitat Distinctiveness	Habitat Condition	Strategic Significance	Baseline biodiversity units
Modified grassland	2.71	Low	Poor	Low	5.42
Total area habitat biodiversity units (AHBUs)					5.42
Other rivers and streams	0.5	High	Fairly poor	High	5.18
Other rivers and streams	0.1	High	Poor with 'major' watercourse encroachment	High	0.35
Total watercourse biodiversity units (WBUs)					5.52

Post-development biodiversity units

Area habitat biodiversity units and watercourse biodiversity units are considered separately within biodiversity metric 4 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 biodiversity metric 4, 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 biodiversity metric 4 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 will be generated, and the User Comments column should be used to explain why the baseline and post-development lengths are not the same, as shown in Figure 1.

Retention category biodiversity value							Bespoke compensation agreed for unacceptable losses	Comm
Length retained	Length enhanced	Units retained	Units enhanced	Length Lost	Units Lost	User Comments		
0.4	0.2	4.14	2.07	0.00	0.00		Increase of 0.1km in length enhanced due to channel restoration	
	0.2	0.00	0.69	0.00	0.00		Increase of 0.1km in length enhanced due to channel restoration	

Figure 1. Screenshot of the biodiversity metric 4 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 2.50 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 1.89 watercourse biodiversity units.

The retention of 0.4 km of 'other rivers and streams' habitat in fairly poor condition yields 4.14 watercourse biodiversity units.

Altogether, this gives a total value for enhanced and retained watercourse habitats of 8.53 watercourse biodiversity units, which will result in a net

gain of 3.01 watercourse biodiversity units, which is a 54.59% increase. Losses and gains of watercourse biodiversity units are summarised in Table 2 below.

Area habitat biodiversity unit calculation

The restoration of a more sinuous river channel results in the loss of 0.37 ha of 'modified grassland' equating to 0.74 area habitat biodiversity units. This 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 2.



Table 2. Losses and gains of area habitat biodiversity units and watercourse biodiversity units.

Biodiversity unit type	Description	Biodiversity unit outputs
Area habitat	Baseline – 2.71 ha ‘modified grassland’	5.42
Area habitat	Net on-site retention and enhancement of habitats: <ul style="list-style-type: none"> • 2.12 ha ‘modified grassland’ retained • 0.22 ha ‘modified grassland’ enhanced to ‘other neutral grassland’ in good condition 	+5.97
Total net gain		+0.55
Watercourse	Baseline – ‘other rivers and streams’ habitat: <ul style="list-style-type: none"> • 0.5 km fairly poor, condition • 0.1 km poor condition 	5.52
Watercourse	Net on-site retention – 0.4 km ‘other rivers and streams’	+4.14
Watercourse	Habitat enhancement: <ul style="list-style-type: none"> • 0.1 km ‘other rivers and streams’ in fairly poor condition to 0.2 km ‘other rivers and streams’ in moderate condition 	+2.50
	<ul style="list-style-type: none"> • 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 	+1.89
Total net gain		+3.01
Overall percentage net gain in area habitat biodiversity units		+10.13%
Overall percentage net gain in watercourse biodiversity units		+54.59%

Conclusions

This case study demonstrates the use of biodiversity metric 4 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 a more meandering channel.

When undertaking river restoration, the competent person using biodiversity metric 4 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.

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 biodiversity metric 4. Area habitats, measured in hectares, generate area habitat biodiversity units and the watercourse habitats, measured in kilometres, generate watercourse biodiversity units. These units are unique and cannot be summed, traded, or converted.
- Fairly good and fairly poor condition categories should only be used where there is robust ecological reasoning and justification.
- Developers should consider enhancing 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.

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