Biodiversity Metric 3.1

Auditing and accounting for biodiversity

USER GUIDE

Further information

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Citation

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A – Natural England, B – Environment Agency, C – Department for Environment, Food and Rural Affairs, D – Treweek Environmental Consultants Ltd, E – eCountability Ltd

Acknowledgements

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[1] TREWEEK J. ET AL. (2009) *Scoping study for the design and use of biodiversity offsets in an English Context* [online]. Defra, London. Available from : https://www.cbd.int/financial/offsets/unitedkingdom-scoping.pdf

[2] TREWEEK J., BUTCHER B. AND TEMPLE H. (2010) Biodiversity offsets: possible methods for measuring biodiversity losses and gains for use in the UK. *CIEEM In Practice* [online]. 69, 29-32. Available from: Researchgate

[3] DEFRA (2012) *Biodiversity Offsetting Pilots. Technical paper: the metric for the biodiversity offsetting pilot in England* [online]. Defra, London. Available from: https://www.gov.uk/government/collections/biodiversity-offsetting

[4] CROSHER I. ET AL, (2019) *The Biodiversity Metric 2.0* [online]. Available from: The Biodiversity Metric 2.0 - JP029 (naturalengland.org.uk)

Image credits

Box 2-1: Natural England (Matt Heydon, Peter Roworth and Julian Dowse)
Box 7-1: Forestry Commission (Jim C. Smith)
Box 9-1: Cartographer Studios Ltd. (Lucy Shuker) and Environment Agency (Neale Hider)
Box 9-2: Environment Agency (Dave Webb)

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1: Introduction

Who is this guidance for?

1.1.   This guidance is for anyone planning to use biodiversity metric 3.1 and anyone who wants to understand the outputs of the metric. This includes developers who have commissioned a biodiversity assessment using the metric, communities wanting to understand the impacts of a local development, and planning authority decision-makers interpreting metric outputs included in a planning application or landowners wishing to provide biodiversity units from their sites to others. In this user guide, Natural England explains how to use biodiversity metric 3.1 and describe the principles and rules underpinning its use.

Why do we need a metric for measuring biodiversity?

1.2.   Biodiversity is the term used to describe the variety of life on earth. It includes everything that is alive on our planet. Habitats are the places in which species live. Species and their habitats form ecosystems, which provide important services to people. Woodlands and saltmarsh, for example, help prevent flooding, while parks and greenspaces make our towns and cities healthier and more attractive places in which to live and work.

1.3.   Biodiversity is under threat, globally and at home. Habitats are being damaged or disappearing and species are declining. This is bad news for nature and for our own health and well-being and that of future generations. Healthy, biodiverse environments are vital for a well-functioning planet. Sadly, their value is often overlooked in decision-making. A metric that quantifies how our actions impacts biodiversity can be used to inform decision-making so that we take proper account of how our activities affect the living planet we depend on. This will help us take steps to recover biodiversity and build healthy, robust ecosystems.

Scope of biodiversity metric 3.1

1.4.   Biodiversity metric 3.1 builds upon the knowledge and experience gained across a variety of different sectors since Defra piloted a provisional metric[5] in 2012. This has been an iterative process, which has included consultation and feedback from a wide range of stakeholders.

1.5.   It balances robustness with simplicity. It uses habitat as a proxy for wider biodiversity with different habitat types scored according to their relative biodiversity potential. This score is then adjusted, depending on the size, condition and location of the habitat, to calculate '**biodiversity units**' for that specific project or development.

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[5] DEFRA (2012) *Biodiversity offsetting pilots. Technical paper: the metric for the biodiversity offsetting pilot in England* [online]. Defra, London. Available from: https://www.gov.uk/government/collections/biodiversity-offsetting

1.6. It can be used to measure both on-site and off-site biodiversity changes for a project or development and can be used to measure the change in biodiversity achieved by different land management interventions. The metric also accounts for some of the risks associated with creating or enhancing habitat.

1.7. It calculates the change in biodiversity that results from a project or development by subtracting the number of '**pre-intervention'** or 'baseline' biodiversity units (i.e. those originally existing on-site and off-site) from the number of '**post-intervention'** units (i.e. those projected to be provided after the development or change in land management). **It is important to note that achieving gains in biodiversity from the calculation does not necessarily mean a development meets any wider requirements of planning policy or law relating to nature conservation or biodiversity**.

1.8. It only accounts for **direct impacts** on habitats within the footprint of a development or project. The metric has been developed to be a simple assessment tool and only considers direct impacts on biodiversity through impacts on habitats. **Indirect impacts** are also important, but they are not included in the metric.

1.9. The units generated by biodiversity metric 3.1, like all biodiversity unit calculations, come with a 'health warning'. The outputs of this metric are not absolute values but provide a proxy for the relative biodiversity worth of a site pre- and post-intervention. The quality and reliability of outputs will depend on the quality of the inputs. This user guide provides advice on how to use the biodiversity unit approach and where and when it is appropriate for use. The metric is not a complex ecological model and does not substitute for expert ecological advice. The metric does not override or undermine any existing planning policy or legislation, including the mitigation hierarchy, which should always be considered as the metric is applied.

1.10. It does not include species explicitly. Instead, it uses habitats as a proxy. The metric does not change existing levels of species protection and does not replace regulatory processes for species protection.

1.11. Through the use of robust trading rules, positively weighting outcomes of 'strategic significance', and measuring changes in habitat size, as well as biodiversity unit value, biodiversity metric 3.1 encourages projects that contribute towards establishing **'more, bigger, better and joined[6]'** ecological networks.

1.12. To simplify and streamline the calculation process, biodiversity metric 3.1 comes with a free calculation tool to calculate biodiversity units. A short user guide for the calculation tool is also available.

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[6] See: LAWTON J.H. ET AL (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network* [online]. Report to Defra. Available from: Making Space for Nature: (nationalarchives.gov.uk)

When can biodiversity metric 3.1 be used?

1.13. Biodiversity metric 3.1, when used with appropriate professional advice and ecological knowledge, enables biodiversity to be measured in a consistent and robust way. The metric can be used to inform and improve planning, design, land management and decision-making.

1.14. It can be used to:

- Assess or audit **the biodiversity unit value** of an area of land;

- **Calculate the losses and gains** in biodiversity unit value resulting from changes or actions which affect biodiversity, such as from development or changing the conservation management of a land holding;

- **Predict** the likely effectiveness of creating new or enhancing existing habitats; and

- **Compare** different plan and project proposals for a site allowing more objective assessments of alternative approaches to be made.

1.15. The metric can be used throughout all stages of a project or scheme, from site selection and options assessment through to detailed design. The earlier it is applied the greater the opportunities for:

- Optimising the design to deliver net gains within the project area;

- Determining whether the project is suitable for application of this metric; and

- Testing whether the outcomes are as expected.

1.16. The outputs of the metric are only as robust as the quality of data and professional input into the metric. Scheme designs need to be realistic and deliverable within the relevant timeframe and justified by available evidence.

1.17. This metric has been designed for application to UK terrestrial and intertidal habitats. These include freshwater habitats and linear habitat features. The metric approach can be used to account for habitats within a defined boundary. It can be applied at a range of scales, from developments of a few houses or land management changes in a single field, to strategic allocations or entire land holdings.

Applying the mitigation hierarchy when using the metric

1.18. Biodiversity metric 3.1 supports and reinforces the application of the **mitigation hierarchy** which is an important principle of ecological good practice (see Figure 1-1). Applying the mitigation hierarchy means aiming to retain habitats *in situ* and avoiding or minimising habitat damage so far as possible, before looking to enhance or recreate habitats. This sequential approach is encouraged by biodiversity metric 3.1 because it allows overall biodiversity gains to be achieved more easily through the avoidance of on-site habitat losses, rather than relying solely on the creation of new habitat or the enhancement of existing habitat. It works this way because the metric applies multipliers that are based on the risks inherent in creating or restoring habitat, which are not applicable when existing habitat is safeguarded.

Avoid	Minimise	Remediate	Compensate
Where possible habitat damage should be avoided	Where possible habitat damage and loss should be minimised	Where possible any damaged or lost habitat should be restored	As a last resort, damaged or lost habitat should be compensated for.
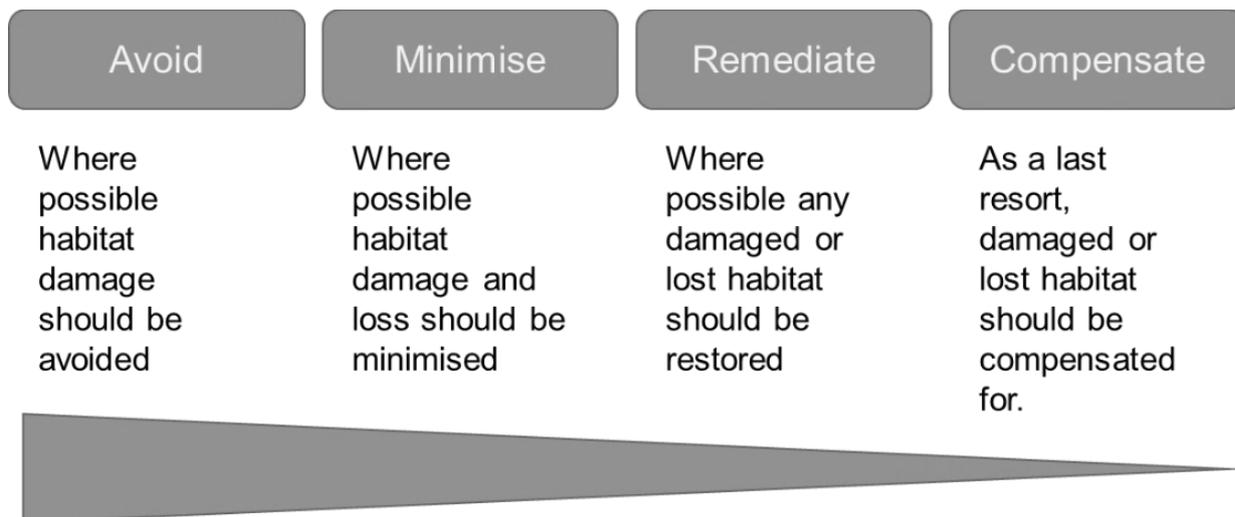
FIGURE 1-1: The mitigation hierarchy[7]

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[7] Adapted from: DEFRA (2018) *Net Gain Consultation Proposals* [online]. Defra, London. Available from: https://consult.defra.gov.uk/land-use/net-gain/supporting_documents/netgainconsultationdocument.pdf

2: Summary of how biodiversity metric 3.1 works

2.1.   This chapter provides an overview of what biodiversity metric 3.1 measures, and what the key process, the principles and rules that must be applied. More detailed explanation of the metric's functions for frequent or technical users can be found in subsequent chapters and the Technical Supplement.

What the metric measures

2.2.   Biodiversity metric 3.1 uses **habitats**, the places in which species live**,** as a proxy to describe biodiversity. These habitats are converted into '**biodiversity units**'. These biodiversity units are the 'currency' of the metric.

2.3.   Biodiversity units are calculated using the **size** of a parcel[8] of habitat and its **quality**. The metric uses **habitat area** (measured in hectares) as its core measurement, except for linear habitats (hedgerows, lines of trees, rivers and streams) where **habitat length** (measured in kilometres) is used.

2.4.   To assess the **quality** of a habitat, the biodiversity metric 3.1 scores:

   a. Habitats of different types, such as woodland or grassland, according to their relative **distinctiveness**. Habitats that are scarce or declining typically score highly relative to habitats that are more common and widespread.

   b. The **condition** of a habitat. Scoring the biodiversity value of the habitat relative to others of the same type.

   c. Being 'better' and 'more joined-up' are important facets of habitats that can contribute to halting and reversing biodiversity declines[9], so the metric also accounts for whether or not the habitat is sited in an area identified, typically in a relevant local strategy or plan, as being of **strategic significance** for nature.

2.5.   Where new habitat is created, or existing habitat is enhanced, the difficulty and associated **risks** of doing so are considered by biodiversity metric 3.1. If habitat is created to compensate for losses elsewhere, then the metric also considers its proximity to the site of the losses.

The difference between area and linear habitat units in the metric

2.6.   Biodiversity metric 3.1 includes separate calculations for area habitats (such as a woodland) and linear habitats (such as a hedgerow or stream). This is because

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[8] Parcels are simply distinct portions of each habitat type present.

[9] See: LAWTON J.H. ET AL (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network* [online]. Report to Defra. Available from: Making Space for Nature: (nationalarchives.gov.uk)

habitat length is a more meaningful measure of linear habitats than their area due to their function as ecological corridors.

2.7. There are therefore three broad categories of habitats and biodiversity units for which scores are calculated differently:

- Area habitats (such as grasslands, woodlands and mudflats);
- Linear hedgerows and lines of trees; and
- Linear rivers and streams.

2.8. The separate calculation tool provides a simple way of undertaking all three biodiversity unit calculations. It is an important rule of the metric that **the three types of biodiversity units described above are unique and cannot be summed, traded or converted** (Rule 4). When reporting biodiversity gains or losses with the metric, the three different biodiversity unit types must be reported separately and not summed/combined to give an overall biodiversity unit value (or percentage change).

How area habitat biodiversity units are calculated

2.9. To measure the biodiversity value of habitats it is first necessary to define the site boundary and then divide it into appropriate habitat parcels as needed. The parcel size, habitat type and condition of each habitat parcel are then recorded. The metric uses widely used classifications[10] for categorising habitats.

2.10. The metric operates by applying a score to each of the quality elements set out above in section 2.4. These quality components are summarised in Figure 2-1.

Distinctiveness	A score based on the type of habitat present. e.g. modified grassland has a "Low" distinctiveness score, lowland meadows are "Very High"
Condition	A score based on the biodiversity value of the habitat relative to others of the same type. This is determined by condition criteria set out in the technical supplement
Strategic significance	A score based on whether the location of the development and/or off-site work or the habitats present/created have been identified as significant for nature

FIGURE 2-1 Quality components of biodiversity metric 3.1

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[10] Habitat classifications used in the metric include:
UK Habitat Classification, EUNIS and WFD Lakes typology.
Further detail is provided in Chapter 6 and Part 2 of the Technical Supplement.

2.11. The metric operates by applying a score to each of these elements. It then multiplies the size of each habitat parcel with each of these 'quality' scores to produce a number that represents the biodiversity unit value of each habitat parcel (see Box 2-1).

2.12. The user first calculates the **baseline** of a site in biodiversity units before any development or management change has occurred (i.e. **pre-intervention**).

2.13. The calculation is normally then repeated for the **post-intervention** scenario. This calculation should include any retained or enhanced existing habitats and newly created habitats. At this stage, because the metric is measuring predicted changes rather than existing habitats, additional factors to account for the risk associated with creating, restoring or enhancing habitats are also considered. Figure 2-2 sets out the three risk factors incorporated into the metric.

Difficulty of creating or restoring/enhancing a habitat	A pre-assigned score based on how difficult the habitat type is to create or restore/enhance
Temporal risk	'Time to target condition' A pre-assigned score based on how long the habitat type takes to establish and reach a target condition.
Spatial Risk	'Spatial risk' A score based on distance between the site of habitat loss and the site where creation/enhancement is provided

FIGURE 2-2 Risk components of biodiversity metric 3.1

2.14. Biodiversity units post-intervention are then deducted from the baseline pre-intervention units to give a net change in unit value. Biodiversity metric 3.1 can be used to calculate the numbers of units or the percentage net gain your design is predicted to deliver. It can also calculate the size of any change (in hectares or kilometres of habitat). The post-intervention proposals can be adjusted to revise the scheme design to improve the number of biodiversity units or percentage net gain obtained as well as the corresponding area change.

2.15. The metric can be used to measure off-site habitat changes, where this is required to achieve a net gain, usually when the metric is being applied in a development context. The processes for measuring on-site and off-site changes are very similar. The biodiversity unit value of the off-site habitats is calculated for the baseline pre-intervention and post-intervention stages. The pre-intervention units are then subtracted from the post-intervention units to work out how many biodiversity units will result from that off-site habitat change. For off-site changes, there is an additional 'spatial risk' multiplier which is applied to reflect the proximity of the off-site changes to the project site where the biodiversity loss is occurring. Biodiversity metric 3.1 then combines any off-site gains or losses of biodiversity units with the on-site results to

show overall changes in biodiversity unit value and percentage change, as well as the corresponding area change, relative to the on-site baseline.

2.16. The examples in Box 2-1 and Box 2-2 illustrate the general approach used to calculate the biodiversity unit value for habitats, as described above. A more detailed explanation of this process is given in Chapter 5.

Box 2-1: Calculating the biodiversity unit value of a habitat

How to calculate biodiversity value for habitats is illustrated in the scenario below:

- The pre-intervention calculation establishes the baseline biodiversity unit value of a habitat. It is calculated by multiplying the size of a habitat parcel by measures of habitat 'quality'.
- The post-intervention calculation gives the biodiversity unit value of a habitat after it has been changed. This calculation uses the same size and quality measures but also takes account of risk factors in creating or enhancing habitats.

PRE-intervention biodiversity calculation (the baseline)

Size of habitat parcel	x	Distinctiveness	x	Condition	x	Strategic Significance	=	Biodiversity units
10 (ha)	x	6 (high)	x	1 (poor)	x	1.15 (high)	=	69 units

POST-intervention biodiversity calculation (for newly created habitat)

Size of habitat parcel	x	Distinctiveness	x	Condition	x	Strategic Significance	x
10 (ha)	x	6 (high)	x	3 (good)	x	1.15 (high)	x

Difficulty	x	Time to target condition	x	Spatial risk	=	Biodiversity units
0.67 (med)	x	0.837 (5 yrs)	x	1 (local)	=	116 units

Calculation of gains or losses

POST units	–	PRE units	=	Net change
116 units	–	69 units	=	+47 units

■ Habitat parcel		■ Risk factor
■ Measure of biodiversity quality		■ Value in biodiversity units

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BOX 2-2: Practical application

To calculate the change in biodiversity unit value resulting from a development (or other intervention) you first survey and then divide the site up into distinct parcels of differing habitat type and condition (i.e. the same habitat type in different condition should be recorded separately within the metric).

Using this information, you can calculate the baseline (or pre-intervention) biodiversity unit value of each habitat parcel using the free calculation tool provided for use with biodiversity metric 3.1.

Next, using your design plans for the development, calculate the biodiversity unit value for the habitats that are expected to be retained, plus the values for any enhanced or newly created habitats (post-intervention).

The change in biodiversity is worked out by subtracting the project's on-site baseline biodiversity unit value from the sum of post-intervention values for retained, created and enhanced habitats. This is then combined with any off-site gains to give a final biodiversity unit value which indicates the overall net gain or loss for the scheme. This is illustrated in the graphic below:

Development site

Pre-intervention 'baseline'

The site survey identifies two habitat types: A and B.

Biodiversity units of habitat

A — 75 units
B — 60 units

Sub-totals
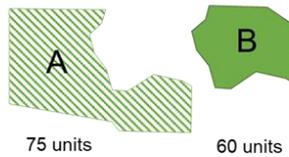
135 units

Post-intervention

The development footprint will destroy about two-thirds of the habitat on site.

LOSSES of habitats A and B

50 units
20 units

70 units

The remaining area of habitat B is retained

RETAINED habitat

40 units

40 units

The remaining habitat A is enhanced, for example, by improving its condition, which uplifts its unit value

ENHANCED habitat

25 units enhanced to give an additional 25 units (total = 50 units)

50 units

(retained + enhanced) – baseline = change in biodiversity

(40 + 50) – 135 = - 45 units

45 units of off-site compensation is required to avoid a biodiversity loss, or the design could be revisited to reduce losses

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Key process steps

2.17. The key steps you need to follow to make practical use of the metric are outlined in Figure 2-3.

Step 1

• Project planning

- Identify sites where the metric will be used
- Identify the planned actions or interventions that will change habitats (e.g. development/land management)
- Identify metric components to use (e.g. area-based habitats, hedgerows, river and streams)

Step 2

• Data collection

- Collect habitat and other data from site(s)
- Check local plans/policies for strategic significance of site(s)
- Determine expected effects of habitat changes or interventions on habitats present (if applicable)

Step 3

• Calculation

- Input data into the calculation tool to generate biodiversity unit scores
- If evaluating effects of changes or interventions run the calculator tool for pre- and post-change scenarios

Step 4

• Informing design and decisions

- Use results to improve design, communicate gains and losses, and inform planning decisions

FIGURE 2-3: The 4 key steps to using biodiversity metric 3.1

Principles and rules for using the metric

2.18. The metric is a tool that can be used to help inform plans and decisions. It is important, however, to be aware of its limitations and to conduct assessments with regard to a set of principles and rules.

Limitations

2.19. The metric uses habitats as a proxy for biodiversity. Although this is a rational means of measuring biodiversity value, it is a simplification of complex ecological processes which are not readily captured. While the scoring of habitats is informed by ecological reasoning and the available evidence, the outputs of biodiversity unit calculations are not scientifically precise or absolute values. Therefore, the generated biodiversity unit scores are a proxy for the **relative** biodiversity worth of a habitat or site. This is appropriate for a variety of intended uses, but there may be exceptional circumstances where use of the metric is not appropriate.

2.20. The metric and its outputs should therefore be interpreted, alongside ecological expertise and common sense, as an element of the evidence that informs plans and decisions. The metric is not a total solution to biodiversity decisions. It can, for example, help you work out how much new or restored habitat is needed and in what condition to compensate for a loss of habitat, but it does not tell you the appropriate composition of plant species to use or which micro-habitats might benefit locally important species.

Note: neither the metric, nor the accompanying condition sheets, are a guide on how to best manage a site.

Principles

- **Principle 1: The metric does not change the protection afforded to biodiversity.** Existing levels of protection afforded to protected species and habitats are not changed by use of this or any other metric. Statutory obligations will still need to be satisfied.

- **Principle 2: Biodiversity metric calculations can inform decision-making** where application of the mitigation hierarchy and good practice principles[11] conclude that compensation for habitat losses is justified.

- **Principle 3: The metric's biodiversity units are only a proxy for biodiversity and should be** treated **as relative values.** While it is underpinned by ecological evidence the units generated by the metric are only a proxy for biodiversity and, to be of practical use, it has been kept deliberately simple. The numerical values generated by the metric represent relative, not absolute, values.

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[11] See: CIEEM, CIRIA, IEMA (2016) *Biodiversity Net Gain – Good Practice Principles for Development* [online]. Available from: Biodiversity-Net-Gain-Principles.pdf (cieem.net)

- **Principle 4: The metric focuses on typical habitats and widespread species; important or protected habitats and features should be given broader consideration.**

  - Protected and locally important species needs are not considered through the metric, they should be addressed through existing policy and legislation.

  - Impacts on protected sites and irreplaceable habitats are not adequately measured by this metric. They will require separate consideration which must comply with existing national and local policy and legislation. Data relating to these can be entered into the metric, to give an indicative picture of the biodiversity value of the habitats present on a site, but this should be supported by bespoke advice.

- **Principle 5: The metric design aims to encourage enhancement, not transformation, of the natural environment.** Proper consideration should be given to the habitats being lost in favour of higher-scoring habitats, and whether the retention of less distinctive but well-established habitats may sometimes be a better option for local biodiversity.

  - Habitat created to compensate for loss of natural or semi-natural habitat should be of the same broad habitat type (e.g. new woodland to replace lost woodland) unless there is a good ecological reason to do otherwise (e.g. to restore a heathland habitat that was converted to woodland for timber in the past[12]).

  - Although the metric does not explicitly consider the biodiversity value provided by individual species, consideration should be given to locally relevant species interests when creating or enhancing habitats.

- **Principle 6: The metric is designed to inform decisions, not to override expert opinion**. Management interventions should be guided by appropriate expert ecological advice and not just the biodiversity unit outputs of the metric. Ecological principles still need to be applied to ensure that what is being proposed is realistic and deliverable based on local conditions such as geology, hydrology, nutrient levels, etc. and the complexity of future management requirements.

- **Principle 7: Compensation habitats should seek, where practical, to be local to the impact.** They should aim to replicate the characteristics of the habitats that have been lost, taking account of the structure and species composition that give habitats their local distinctiveness.

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[12] In this case the Open Habitats Policy would need to be followed to ensure suitability of the proposed change. Available on: FORESTRY COMMISSION (2010) *When to convert woods and forests to open habitat in England: Government policy March 2010* [online]. Forestry Commission, Bristol. Available from: When to convert woods and forests to open habitat in England (March 2010) - GOV.UK (www.gov.uk)

- Where possible compensation habitats should contribute towards nature recovery in England by creating 'more, bigger, better and joined up' areas for biodiversity[13].

- Through the strategic significance and spatial risk factors the biodiversity metric 3.1 places greater reward for habitat creation where it is strategically important and locally relevant.

- **Principle 8: The metric does not enforce a mandatory minimum 1:1 habitat size ratio for losses and compensation but consideration should be given to maintaining habitat extent and habitat parcels of sufficient size for ecological function.** A difference can occur because of a difference in quality between the habitat impacted and the compensation provided. For example, if a habitat of low distinctiveness is impacted and is compensated for by the creation of habitat of higher distinctiveness or better condition, the area needed to compensate for losses can potentially be less than the area impacted. The metric calculates losses and gains by size as well as by biodiversity unit value or percentage. *Note: consideration should be given to whether reducing the area or length of habitat provided as compensation is an appropriate outcome.*

Rules

- **Rule 1:** Where the metric is used to measure biodiversity change, biodiversity unit values need to be calculated both prior to the intervention and post-intervention for all parcels of land / linear features affected.

- **Rule 2:** Compensation for habitat losses can be provided by creating new habitats, or by restoring or enhancing existing habitats. Measures to enhance existing habitats must provide a significant and demonstrable uplift in distinctiveness and/or condition to record additional biodiversity units.

- **Rule 3:** 'Trading down' must be avoided. Losses of habitat are to be compensated for on a 'like for like' or 'like for better' basis. New or restored habitats should aim to achieve a higher distinctiveness and/or condition than those lost. Losses of irreplaceable or very high distinctiveness habitat cannot adequately be accounted for through the metric.

- **Rule 4:** Biodiversity units generated by biodiversity metric 3.1 are unique to this metric and cannot be compared to unit outputs from versions 3.0, 2.0, the original Defra metric, or any other biodiversity metric. Furthermore, the three types of biodiversity units generated by this metric (for area, hedgerow and river habitats) are unique and cannot be summed, traded or converted.

- **Rule 5:** It is not the area/length of habitat created that determines whether ecological equivalence or better has been achieved but the net change in biodiversity units. Risks associated with creating or enhancing habitats mean that it may be necessary to create or enhance a larger area of habitat than that lost, to fully compensate for impacts on biodiversity.

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[13] See: LAWTON J.H. ET AL. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network* [online]. Report to Defra. Available from: Making Space for Nature: (nationalarchives.gov.uk)

- **Rule 6:** Deviations from the published methodology of biodiversity metric 3.1 need to be ecologically justified and agreed with relevant decision makers. While the methodology is expected to be suitable in the majority of circumstances it is recognised that there may be exceptions. Any local or project-specific adaptations of the metric must be transparent and fully justified.

Irreplaceable habitats[14] and biodiversity metric 3.1

2.21. Impacts on 'irreplaceable' habitats are not adequately measured by this metric (Principle 4 and Rule 3). They require separate consideration which must comply with relevant policy and legislation.

2.22. Data relating to these habitats can be entered into biodiversity metric 3.1 to:

- Give an indication of the biodiversity value of the habitats present on a site (the baseline); and/or

- Allow actions to enhance or restore these important habitats to contribute towards the delivery of net gain.

2.23. The metric can also be used to give an indication of the minimum amount of replacement habitat that should be provided, however, it cannot and should not replace case-specific assessments. Bespoke compensation needs to be agreed with the relevant decision maker for **any** losses or impacts to these habitats.

Ancient woodland and biodiversity metric 3.1

2.24. Ancient woodland[15] is a finite and irreplaceable resource and is protected by existing policy and legislation[16]. However, ancient woodland is not a discrete habitat type and, as such, is not listed in biodiversity metric 3.1. By definition, ancient woodland encompasses ancient semi-natural woodlands (ASNW) and plantations on ancient woodland sites (PAWS) and so could, correctly, be recorded as any of the metric 3.1 woodland habitat types. It is therefore essential to check the latest published version

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[14] Defined in: MINISTRY OF HOUSING, COMMUNITIES AND LOCAL GOVERNMENT (now the Department for Levelling Up, Housing and Communities (DLUHC)). (2021) Annex 2: Glossary. In: *National Planning Policy Framework* [online]. DLUHC, London. Available from: National Planning Policy Framework (publishing.service.gov.uk)

[15] Ancient Woodland is identified using presence or absence of woods from old maps, information about the wood's name, shape, internal boundaries, location relative to other features, ground survey, and aerial photography. Details in: NATURAL ENGLAND (2022) *Ancient Woodland (England)* [online]. Available from: Ancient Woodland (England) - data.gov.uk

[16] DLUHC. (2021) Habitats and Biodiversity, s.180(c). In: *National Planning Policy Framework* [online]. DLUHC, London. Available from: National Planning Policy Framework (publishing.service.gov.uk)

of the Ancient Woodland Inventory Database[17] to determine whether an area of woodland is ASNW or PAWS and hence, whether bespoke assessment and compensation is likely to be required. If a woodland is less than 2ha, please check against the criteria set out in the Ancient Woodland Inventory Handbook (Sansum and Bannister, 2018)[18] for features that indicate whether it may be ancient.

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[17] DEFRA (2022) *Multi-Agency Geographic Information for the Countryside* (MAGIC) [online]. Available from: http://www.magic.gov.uk/. The Ancient Woodland Inventory Database is, at the time of publication, in a provisional state and it is intended that it will be updated to include areas of woodland less than 2ha

[18] SANSUM, P. AND BANNISTER, N.R. (2018) *A Handbook for updating the Ancient Woodland Inventory for England* [online]. Natural England Commissioned Reports NECR248. Available from: Ancient Woodland Inventory handbook - NECR248 (naturalengland.org.uk)

3: Data collection and preparation for use in the metric

3.1.   This section sets out how to collect the data required for a biodiversity net gain assessment, and how to prepare this data for use in biodiversity metric 3.1.

Defining 'on-site' and 'off-site' for use with the biodiversity metric 3.1

3.2.   The biodiversity metric can be applied to on-site and off-site land. These terms are defined below:

- 'On-site' includes all land within the boundary of a project. In a planning context, this usually means within a red line boundary.

- 'Off-site' is all land outside of the on-site boundary, regardless of ownership.

3.3.   If the project is associated with a planning application, then the baseline would constitute all habitat features found within the red line boundary of the development. The red line boundary should be agreed with the relevant decision maker.

3.4.   A metric assessor should:

- Record all on-site inputs within the on-site sections of the metric; and

- Record off-site data inputs within the off-site sections of the metric.

3.5.   An off-site provider is required to use the off-site sections of the metric only. Until linked to a on-site project or development, a neutral multiplier of 1 should be used When an off-site assessment is linked to an on-site project the correct spatial risk multiplier <u>must</u> be entered into the off-site section of the biodiversity metric. More information on spatial risk multipliers and how to apply them is provided in sections 5.52 through 5.55.

Calculation inputs

3.6.   To calculate area biodiversity units, the following data is required for both existing and proposed habitat parcels (a habitat parcel is a contiguous area of habitat of the same type and condition):

- Habitat types (including artificial and sealed surfaces of no biodiversity value);

- Area of each habitat parcel (hectares);

- Condition of each habitat parcel (good, moderate, poor); and

- Strategic significance of each habitat parcel (high, medium, low).

3.7.   To calculate hedgerow and line of trees biodiversity units, the following data is required for both existing and proposed hedgerow habitat and for both on-site and off-site locations:

- Hedgerow / line of trees type - based on the descriptions in Table TS1-2 in the Technical Supplement;

- Length of each hedgerow / line of trees parcel (kilometres);

- Condition of each hedgerow / line of trees parcel (good, moderate, poor);
- Strategic significance of each hedgerow / line of trees parcel (high, medium, low); and
- Spatial risk (off-site interventions only).

3.8. To calculate rivers and streams biodiversity units the following data is required for both existing and proposed watercourse habitat and for both on-site and off-site locations:

- Priority Habitat classification, assessed using available data sets;
- River classification – to be assessed as a main river, ordinary watercourse, ditch or canal using available data sets;
- Culvert presence, meaning whether the watercourse is contained within a culvert;
- Length of each watercourse within the site (kilometres);
- Condition of each watercourse (good, moderate, poor);
- The extent of any interventions, encroachment into the riparian zone and watercourse channel;
- Strategic significance of each watercourse (high, medium, low); and
- Spatial risk (off-site locations only).

Who and when?

3.9. A competent person must carry out the habitat survey and assessment. They should be able to confidently identify the positive and negative indicator species for the range of habitats likely to occur in a given geographic location at the time of year the survey is undertaken.

3.10. Habitat surveys can be undertaken year-round, though it is important to note that the optimal survey season is April to September inclusive (for most habitat types). In the absence of seasonally appropriate survey data/evidence the assessor must use a precautionary approach to assessing condition criteria which are not measurable at the time of year the survey is undertaken.

3.11. The rivers and streams condition assessment requires users to be trained and accredited[19].

Approach

3.12. The best approach to take for data collection will depend on the wider survey strategy and specific data requirements for the development or site being affected.

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[19] Training details can be found at: MODULAR RIVER SURVEY TEAM. (2022) *River Condition Assessment for Biodiversity Metric 3.0* [online]. Available from: https://modularriversurvey.org/river-condition

However, the steps below set out some useful stages to consider when collecting and preparing data for use in the biodiversity metric.

Step 1: **Before site visit – ecological desk study**

a. Online data searches (such as [MAGIC](#) or Environment Agency Searches) can help to identify the presence of any Priority Habitats, irreplaceable habitats, and statutory designated sites for nature conservation.

b. Searching for species records (such as using the [NBN Atlas](#), [MAGIC](#), or contacting Local Environmental Records Centres (LERCs)) can give an indication of how rich in biodiversity the site and its surroundings might be. This will help determine any constraints or aspects of the site's biodiversity that may need more detailed consideration outside of the scope of biodiversity net gain. It could also influence the post-intervention habitat types and future management needs of the site.

c. It is also advisable to check that recent maps or aerial images of the habitats on the site are consistent with the state of the site now. This can help identify whether degradation or destruction of baseline habitats (e.g. the removal of habitat before development) has already occurred. Where it is apparent that a recent detrimental change has occurred, this should be communicated to the relevant decision maker. In applying this scenario to the metric tool, the precautionary principle should be adopted. Where practical, the baseline data inputs to the tool should reflect the value of the habitat pre-degradation/pre-destruction.

Step 2: **Site visit – identifying and mapping habitats**

a. An initial site walkover will help identify how the site might best be split into habitat parcels and surveyed in detail most effectively. During the walkover, consider different land uses across the site and identify any areas of higher biodiversity interest (i.e. areas of Priority Habitat or features with potential to support protected species) which may require bespoke survey effort (see Figure 3-1).

b. Where practical, it is advisable to use digital mapping in the field, as this will typically allow more accurate recording of boundaries and make the process of revising maps easier. Using an appropriately scaled, geo-referenced plan or aerial image, the site should then be divided into habitat parcels (contiguous areas of habitats having the same type and condition) as appropriate and hedgerow/watercourse lengths (contiguous areas of hedgerow/watercourse having the same type and condition). Careful consideration should be given to how best to record transition zones between habitat types or other unique habitat features to ensure their biodiversity value is best captured.

c. For rivers and streams, the number of MoRPh (**Mo**dular **R**iver **Ph**ysical) surveys (Shuker et al., 2017[20], and Gurnell et al., 2019)[21] required will depend on the site and the character of the river. The string of MoRPh 5s should capture a minimum 20% length of the river within the on-site area; this will enable changes in riverine condition to be captured. Surveyors should choose the location of their survey sites where noticeable changes in river condition occur e.g. areas of high riverine/riparian quality, areas of physical modification, areas where restoration could occur, and areas of potential impact. A walkover of the site before selecting the survey sites is essential.

d. When a ditch is present alongside a hedgerow it should only be recorded once in the metric. Ditches should EITHER be recorded as:

- A hedgerow or line of trees associated with a bank or ditch; OR
- A ditch in the rivers and streams metric (see Box 3-1 below).

BOX 3-1: Hedges and lines of trees associated with ditches

For these purposes a ditch is defined as follows:

For inclusion in the hedgerows metric, a ditch is 'a linear depression running adjacent to a hedgerow or line of trees (<2m from the hedgerow centre) which may or may not hold water for part of the year'.

For inclusion in the rivers and streams metric, ditches are 'artificially created, linear water-conveyancing features that are less than 5m wide and likely to retain water for more than 4 months of the year. Their hydraulic function is primarily for land drainage, and although partially or fully connected to a river system, they would not have been present without human intervention'.

When a ditch meets the definition for the rivers and streams metric it should be accounted for separately in the rivers and streams metric and, if it occurs adjacent to a hedgerow or line of trees, the hedgerow type should be determined and recorded separately without recognition of the ditch.

If surveying in the winter, the vegetation should indicate whether the ditch is of an ephemeral nature or not.

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[20] SHUKER, L.J., ET AL. (2017) MoRPh: a citizen science tool for monitoring and appraising physical habitat changes in rivers. *Water and Environment Journal* [online]. 31(3): 418-424. Available from: MoRPh: A citizen science tool for monitoring and appraising physical habitat changes in rivers | Request PDF (researchgate.net)

[21] GURNELL, A.M., ET AL. (2019). The contribution of citizen science volunteers to river monitoring and management: International and national perspectives and the example of the MoRPh survey. *River Research and Applications* [online]. Available from: Microsoft Word - Gurnelletal RRA 2019 self-archive (qmul.ac.uk)

e. Hedgerows are mapped as linear features. Area habitats adjacent to hedgerows should be mapped to the centre line of the hedgerow (defined on OS maps by a black line). This will result in a slight overestimation of the area and resulting biodiversity units generated by habitats adjacent to hedgerows.

f. Hedgerows bounding green lanes and double hedgerows should be recorded as two hedgerows rather than a single hedge. This distinction recognises that double hedges are known to be particularly important for wildlife (Walker et al., 2005[22], and Walker et al., 2006)[23].

g. Whilst there is no firm minimum or maximum parcel size, it is recommended that a proportionate approach is taken to avoid the recording of habitat types that cover a total area of less than one square meter (0.0001 ha) or if recording extremely large areas that are likely to vary in their condition as one habitat parcel.

h. Habitats should be classified using either the UK Habitat Classification System (UKHab Ltd., 2022)[24], European Nature Information System (EUNIS) (European Environment Agency (EAA), 2019)[25], Water Framework Directive (WFD) Lakes typologies UK Technical Advisory Group (UKTAG) (2003)[26] (see Box 3-2) or the hedgerows and lines of trees key in Box 8-2. A small number of habitats have definitions specific to biodiversity metric 3.1. This means that habitats are classified in a way which is widely recognised and that can be directly input into the biodiversity metric 3.1 calculation tool. **All habitats used in biodiversity metric 3.1 and their definition source are listed in Table TS2-1.**

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[22] WALKER, M.P. ET AL. (2005) Birds and green lanes: Breeding season bird abundance, territories and species richness. *Biological Conservation* [online]. 126: 540–547. Available from: Birds and green lanes: Breeding season bird abundance, territories and species richness | Request PDF (researchgate.net)

[23] WALKER, M.P. ET AL. (2006) Hedges and green lanes: vegetation composition and structure. *Biodiversity and Conservation*, [online].15:2595–2610. Available on: Hedges and Green Lanes: Vegetation Composition and Structure | SpringerLink

[24] UKHAB LTD. (2022) *UK Habitat Classification* [online]. Available from: http://ukhab.org

[25] EUROPEAN ENVIRONMENT AGENCY (EEA) (2019) *EUNIS habitat type hierarchical view* [online]. Available from: European Nature Information System

[26] UK Technical Advisory Group (UKTAG) (2003) *UK Technical Advisory Group on the Water Framework Directive Guidance on Typology for Lakes for the UK (Draft)* [online]. Available from: Title: (wfduk.org)

i. Unique reference numbers should be assigned to each habitat parcel, hedgerow, line of trees or watercourse and any maps generated should clearly display the unique reference of each parcel or linear feature.

j. Any survey limitations (e.g. access constraints or seasonal constraints) should be noted at this point.

Box 3-2: The UK Habitat Classification (UKHab)

The terrestrial area habitats in biodiversity metric 3.1 are largely based on the UK Habitat Classification system, a free-to-use (open access), unified and comprehensive approach to classifying habitats that is fully compatible with other major existing classifications. It is designed to be suitable for digital or manual use in habitat metrics, impact assessment and sharing data between organisations.

The UK Habitat Classification system was chosen for use in the metric as it translates easily into Priority Habitat types and Habitats Directive Annex 1 types; has scope to incorporate assessments of condition, origin or management regime; and is compatible with digital mapping systems.

The habitat list within biodiversity metric 3.1 includes those derived from the UK Habitat Classification system, but also EUNIS, Water Framework Directive lakes typologies and Annex 1 habitat types. Additionally, some UKHab types have been omitted from the metric because they are better recorded as the actual habitat type presented on the site (e.g. a 'railway corridor' is better split into its individual artificial unsealed surface, grassland and scrub types).

If habitats have been classified using Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Survey typologies, the resulting habitat types can be translated into UKHab for use in the biodiversity metric. A translation table between Phase 1 and UKHab types is provided within the biodiversity metric 3.1. This translation table can be found via the 'Technical data' button in the calculation tool.

Step 3: Site visit – assessing habitat condition

a. All habitat parcels, hedgerows and watercourses must be assigned a habitat condition score: this is a measure of the habitat's quality. Habitat condition can only be assessed after a land parcel, hedgerow or watercourse has been assigned a habitat type (see Tables 3-1 and 3-2).

b. The full methodology for assessing habitat condition is set out within Part 1a of the Technical Supplement. The condition assessment criteria for hedgerows and lines of trees are set out within Part 1b of the Technical Supplement.

c. During a condition assessment, a habitat parcel, hedgerow length or watercourse may be deemed to contain areas of differing condition. If this is the case, the habitat

parcel, hedgerow length or stretch of watercourse must be split accordingly to ensure each parcel represents habitat of the same type and condition.

d. On completion of condition assessments, all habitat parcels should be assigned one of three condition categories: good, moderate or poor. The metric tool does allow for intermediate categories (fairly good and fairly poor) if it is not possible to distinguish between two main condition categories. Justification for use of either intermediate condition category should be noted during the site visit and recorded within the 'Assessor comments' column of the metric tool.

e. If any habitats in the site have recently been destroyed or degraded and it is decided to use pre-degradation habitats as the site's baseline (as is recommended), a precautionary approach should be taken to recording the habitat previously present. This approach should make use of any evidence remaining on site, or from the desk-based assessment (see Step 1) and assume high distinctiveness and good condition for lost or degraded habitats in the absence of evidence to the contrary. The approach should be agreed with the relevant decision maker for the site or project and should be justified in the 'Assessor comments' section of the metric calculator. For example, if an area identified in the desk-based study is recorded as scrub habitat in credible recent mapping or aerial photography and upon arrival the site is now found to be cleared of all vegetation, it should normally be recorded as 'mixed scrub' in 'good' condition.

f. Any additional survey limitations (e.g. access constraints or seasonal constraints) should also be noted at this point.

Step 4: Site visit – opportunities for on-site habitat creation and enhancement

a. As well as collecting data on existing habitats, hedgerows, and watercourses it is also advisable to use any site visits to identify opportunities for enhancement of existing habitat or creation of new habitat. This may help inform development design, ecological mitigation, and ongoing habitat management and maintenance activities.

Note: when determining target habitat types for creation and enhancement it's crucial that the site conditions are suitable to support the target habitat. Additional information may be requested of a project to evidence the land suitability, this is particularly important to include for the creation/enhancement of Priority Habitats (high – very high distinctiveness habitats) which are often more difficult to create.

b. The River Condition Assessment Information System can be used to support scenario modelling of proposed changes to inform potential mitigation options. To forecast predicted post-intervention condition scores, re-run the river condition assessment with planned river restoration interventions and anticipated channel responses. Alternatively, look at the values of the 32 positive and negative 'Condition Indicator' scores to help understand which features can be changed to achieve net gain and then adjust the scores to take account of the impacts of the proposed interventions.

Step 5: **After site visit – assigning strategic significance**

a. All habitat parcels (both baseline and post-intervention) must be assigned a strategic significance score. Recognising strategic significance gives extra value to habitats that are located in optimal locations or are of a type that meet local objectives for biodiversity.

b. The approach taken to determine strategic significance is described in Sections 5.16 - 5.23. For development projects, the relevant local plans and strategies will be determined by the relevant local planning authority.

c. A score should be assigned to each habitat parcel according to the habitat type and what is identified as a priority in a particular area. The options for scoring each habitat parcel are:

- **High** – formally identified in local strategy, plan or policy;
- **Medium** – location ecologically desirable but not identified in a local strategy, plan or policy; or
- **Low** – not identified in a local strategy, plan or policy OR no strategy or plan is in place in the area.

Step 6: **After site visit – preparing data for use in biodiversity metric calculator tool**

a. Baseline data should be assigned a habitat category from Table TS2-1 on collection or, if recorded using an alternative habitat typology, converted to one of these for entry into the metric calculation tool (see Box 3-2).

b. On-site post-intervention habitat data may be created using landscape habitat typologies but must also be converted to a habitat type in Table TS2-1 for entry into the metric calculation tool. This conversion should be based on proposed planting plans and collaboration with the landscape architect is recommended at this stage.

c. For both baseline and post-intervention data, ensure each habitat parcel, hedgerow or watercourse has been assigned a unique ID (this can be the row number in the metric calculation tool). Any maps generated to support the calculation should clearly display the unique ID of each parcel.

d. For both baseline and post-intervention data, ensure the total area being assessed is equal to the sum of all habitat polygons mapped. Include justification in the surveyor comments section if this is not the case (e.g. if the site contains a 5m wide river channel – see h. below). Ensure the sum of baseline and post-intervention habitat parcels are equal, or that any discrepancies are explained. Any overlaps, duplicates or gaps in digital mapping must be resolved before entering data into the metric calculator tool.

e. Where there is an overlap between the developed area (e.g. a building) and an urban habitat (for example a green roof) then only the surface (i.e. open to the sky) habitat should be recorded. In these scenarios the area of developed land / sealed surface

should be reduced by the area of the green roof. This is illustrated in Figure 3-2 at the end of this chapter.

Note: this does not apply to 'Urban - Urban trees'. The canopy of Urban trees is calculated separately to the underlying ground-based habitat. Both the area of ground-based habitat and the area of canopy should be included within the metric.

f. In the rare circumstances where there is overlapping habitat (for example a cantilever green roof over a vegetated garden), both can be recorded, and a justification should be provided regarding the discrepancy in area within the metric tool. As GIS systems only record in 2D, the underlying vegetated garden would need to be entered manually (with appropriate justification) if using the QGIS data import template.

g. If you intend to use the QGIS data import template, you will also need to follow the accompanying guidance relating to data format.

h. The area occupied by rivers and streams habitats greater than 5 metres wide can be recorded as areas as well as lengths. The length will be input into the metric in order to calculate river biodiversity units. The area the watercourse occupies should be noted and excluded from the area biodiversity unit calculation (pre-intervention and post-intervention). This means that, in some circumstances, the sum of the area habitats recorded in the metric will be less than the total site area.

i. Newly excavated river channels will result in a loss in area habitats. Record the loss of area habitat type in the pre-intervention section of the biodiversity metric calculation tool. Similarly, the previous river channels (if a new one has been excavated) may be used to create new areas of habitat such as reedbed or wet woodland.

j. When recording a newly created river channel, the details should be entered as creation or enhancement as appropriate (see Table 8-7).

k. When a river restoration scheme restores a channel line, the length of the final river may be **longer** than the original river baseline. This may be due to increasing the number of meander bends or by including a by-pass channel. This can be accounted for in biodiversity metric 3.1 by entering this final restored length into the 'Length enhanced' column (column U) of the baseline tab. This enhanced length is then automatically applied in the river enhancement tab.

l. When a scheme restores several channels, for example in a braided system, include the final length of restored river channel in the 'Length enhanced' column.

a) Site plan
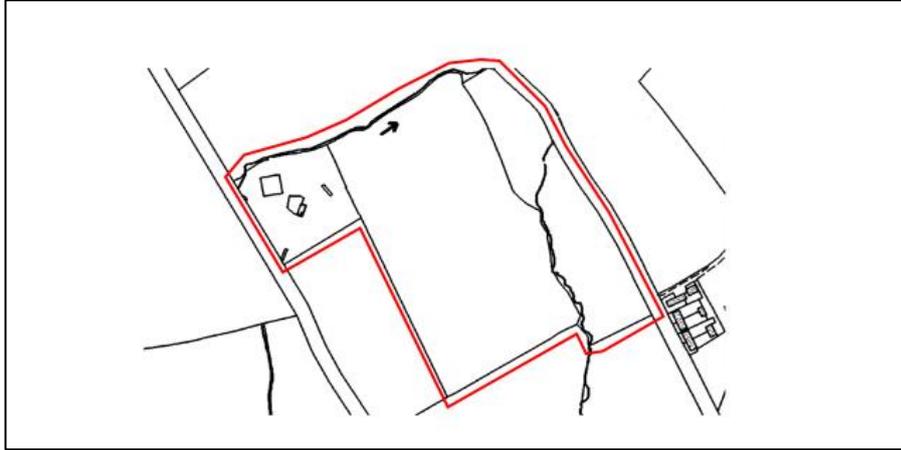
b) Map for area habitats
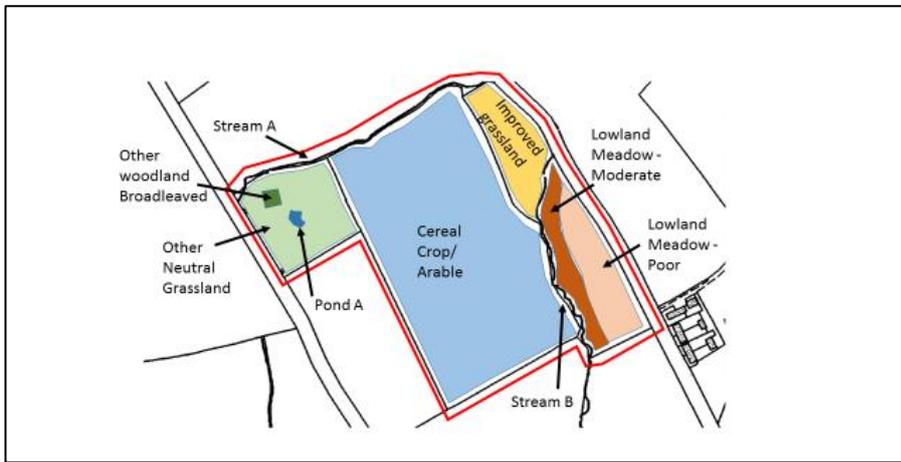
c) Map for linear habitats (hedgerows / lines of trees, rivers and streams)
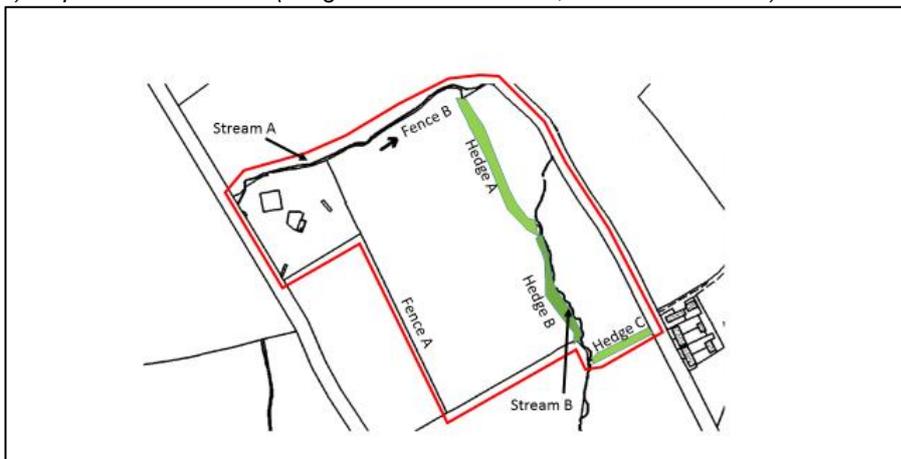
FIGURE 3-1: Examples of data collection maps

TABLE 3-1: Simple data collection records for the maps shown in Figure 3-1 (b) – area habitats

Ref:	Baseline area habitat data	Condition	Size (ha)	Notes
01	Modified grassland	Poor	1.3	
02	Cereal crops	N/A Agricultural	12.3	
03	Lowland meadows	Poor	1.8	
04	Lowland meadows	Moderate	1	
05	Pond (non-Priority Habitat)	Good	0.1	
06	Other woodland; broadleaved	Good	0.2	
07	Other neutral grassland	Moderate	2	

TABLE 3-2: Simple data collection records for the map shown in Figure 3-1 (c) - linear habitats

Baseline supplementary habitat data	Condition	Length (km)	Notes
Stream A	Moderate	0.5	
Stream B	Poor	0.23	
Hedgerow A	Poor	0.18	
Hedgerow B	Moderate	0.130	
Hedgerow C	Poor	0.070	

1)

2)

1) Area of built development = 8 x 8
= 64 m²

2) Area of built development = Area of built environment
– area of green roof

= (8 x 8) – (4 x 4)
= 48 m²
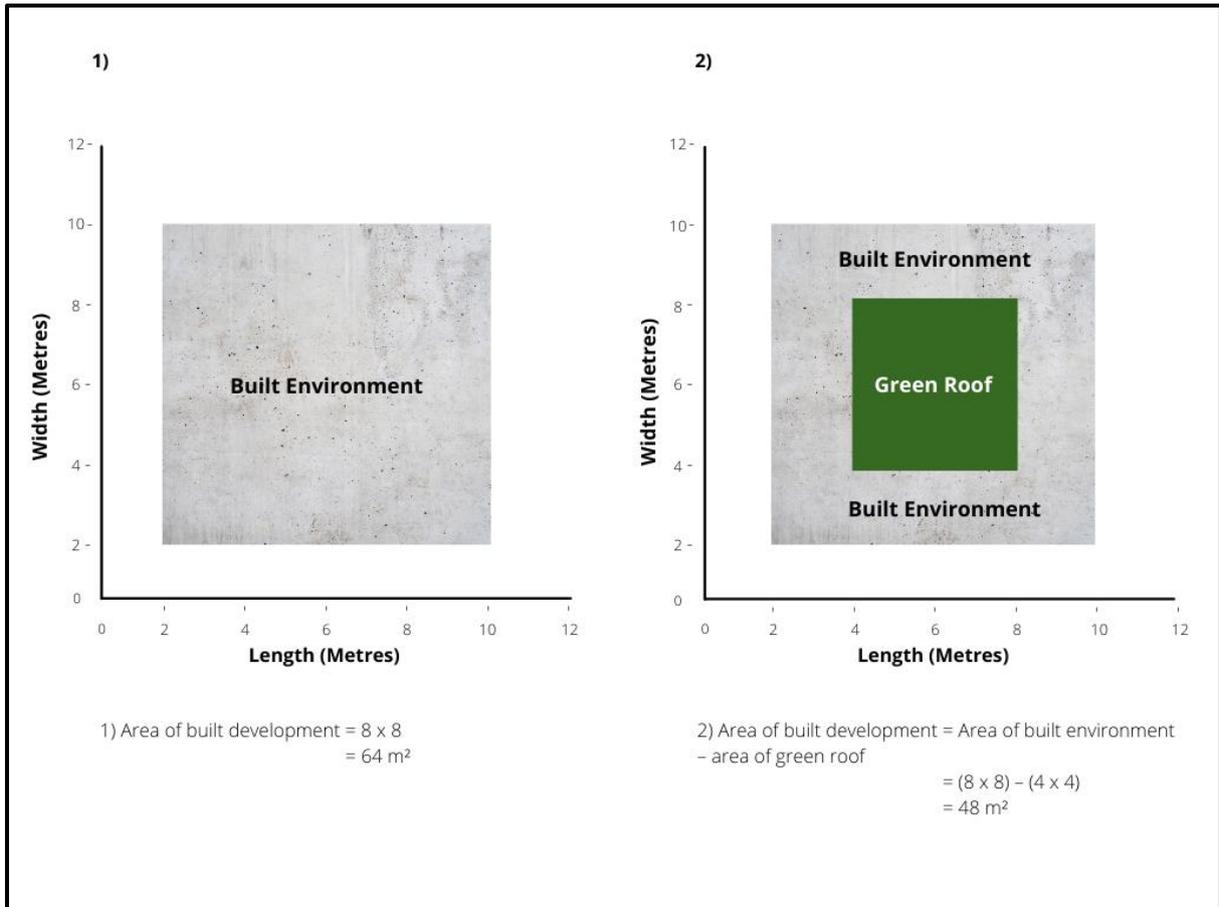
FIGURE 3-2: Accounting for green roofs when calculating area.

4: How to use the calculation tool

4.1   The biodiversity metric 3.1 guidance is accompanied by a [calculation tool](#) and short guide. This chapter provides a more in-depth guide on how to use the tool.

4.2   Cells within the biodiversity metric 3.1 calculation tool are colour coded to aid data entry and interpretation. Icons are also used to convey important information (Figure 4-1).

Cell Formatting	Formatting Meaning
Sheet Inputs	
	Fixed cells which do not change value/text
	Pre-populated values generated by the metric tool
	Results cell
	Editable drop-down lists and manual numeric entry
Suggested Action to Address Habitat Loss	
=	Same habitat required
(≥)	Same broad habitat or a higher distinctiveness habitat required
≥	Same distinctiveness or better habitat required
⚒	Bespoke compensation likely to be required
Data / Trading Flags	
Check ⚠	Alert to users that the value entered is non-standard, trading rules not met or minimum target not reached.
Error ▲	Error in data entry or bespoke agreement required
Satisfied ✓	Trading rules and/or target satisfied

FIGURE 4-1: Key to interpreting cell colour / icons within the metric tool

4.3   The biodiversity metric 3.1 calculation tool is pre-populated with much of the key data that is needed for the calculation. There are separate data entry buttons for pre- and post-intervention for on-site and off-site data (see Figure 4-3). The tool also provides headline results as well as detailed results, outputs and graphics.

4.4   To use the calculation tool, users will need access to data which covers:

- Habitat types;
- Area/length of habitats;

- Habitat condition;

- Strategic significance of each habitat;

- Area to be retained/enhanced;

- Whether bespoke compensation has been agreed (when applicable); and

- Timing of habitat creation (i.e. in advance of habitat loss or delayed).

Step 1: Accessing and preparing the tool

4.5 Open the calculation tool on any computer with Microsoft Excel spreadsheet software installed. The tool opens on the 'Introduction' tab. The metric works best with macros and content enabled[27], and macros must be enabled upon opening the metric to use the navigation buttons.

4.6 From the Introduction page, click on the 'Open tool' button. This will open the tool with the 'Start page' visible as in Figure 4-2 below.

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[27] If your organisation has disabled macros or content in spreadsheets, a version of the metric tool is available without macros. The navigation buttons will not work in the version without macros but the software's default mode of shifting between worksheets/tabs can be used.

FIGURE 4-2: Calculation tool start page

4.7 Instructions on using the tool can be accessed from the 'Instructions' button on the 'Start menu'.

4.8 Under the header 'Project details', enter the required information into the relevant rows. Some of these terms are defined below:

- 'Planning Authority' is the determining authority for any decision being made in relation to the project (often a local planning authority).

- 'Planning Application' is a specific planning application or conservation project reference code (if applicable).

- The 'Applicant' is the person or organisation applying for permission or approval of a project (if applicable).

- The 'Assessor' is the ecologist, or other competent person, filling out the data entry of the metric.

- The 'Reviewer' is the person checking the quality of the data errors prior to submission to any planning authority or other determining authority.

    The 'Metric version' allows for version control. A metric calculation may be carried out at different stages in a project life cycle and this box can help to distinguish between different versions (e.g. through linking to landscape drawing numbers, or using the terms 'draft', 'final' and 'final reviewed').

4.9 Complete all relevant sections of the start page, including inserting illustrative design images of both the baseline and post development scenarios if these are available or required for the project.

4.10 When the start page data entry is complete, click the navigation button on the right labelled 'Main menu'. This will take you to the main menu of the tool (see Figure 4-3).
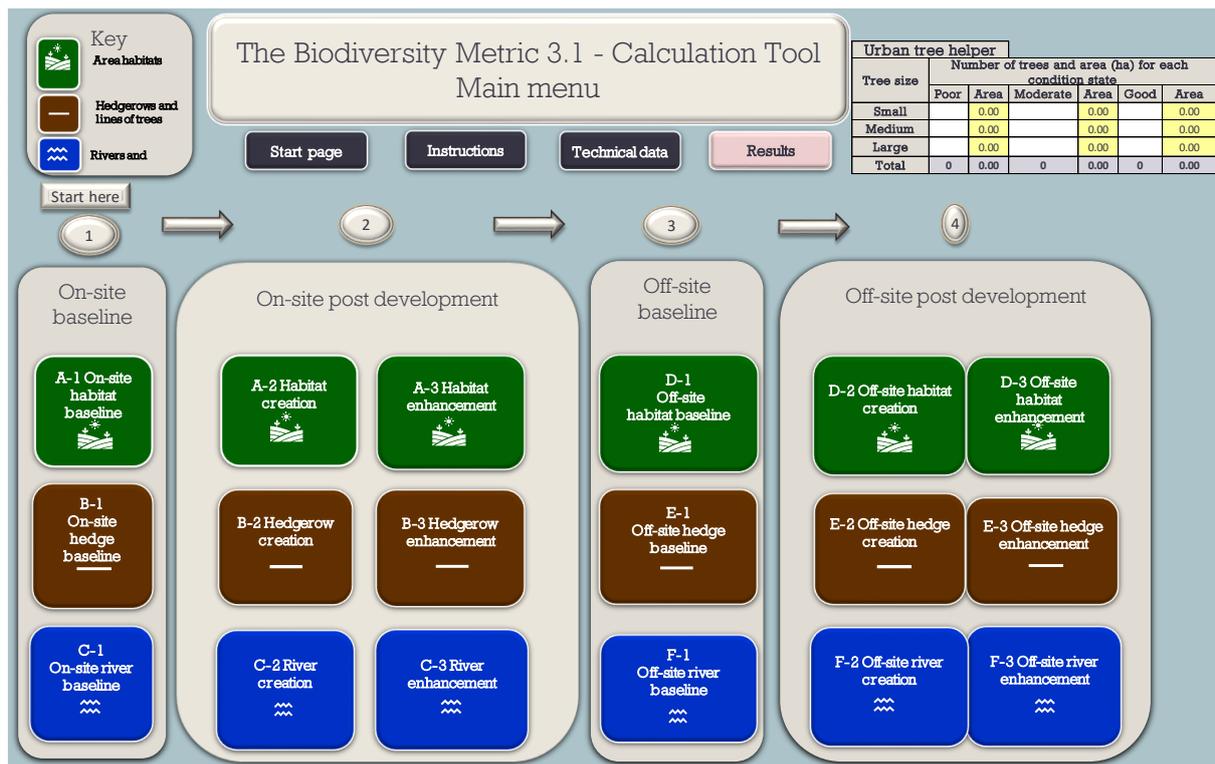
FIGURE 4-3: Calculation tool main menu

4.11   The 'Main menu' provides links to all tabs of the calculation tool. The tool is designed to expand according to the requirements of individual projects. Very few projects will need to use all the tabs in the tool, and many will use only a few.

4.12   The 'Main menu' also hosts an 'Urban tree helper' tool to assist in calculating an area measurement in hectares for a given number of trees. Simply enter the number of trees for each size category. This will generate a figure in hectares which can then be manually entered on the baseline sheet. Further information of urban trees is provided in Chapter 7.

4.13   To navigate between the tabs in the tool, click on the relevant button. When finished entering/viewing data, click the 'Main menu' button at the top of tab, this will take you back to the main menu. If you are using a macro-free version, you can use the tabs shown at the bottom of the window to navigate.

4.14   Once the relevant data entry tab is open, the 'Condense/show columns' buttons, and equivalents for rows, can be used at any time to aid data input.

Step 2: Baseline (pre-intervention) data entry

Entering baseline data

> **Top Tip:** Prepare your data before completing the metric calculation tool. Think about how the individual parcels within the site will change after the intervention and which habitats will be lost, retained, and enhanced.

4.15 The baseline provides a proxy measure for the quality, quantity and type of habitat within the site boundary prior to an intervention. The information you will need to enter to complete your baseline assessment is detailed in Chapter 3. Which tabs to complete will depend on the type of habitats you have on your site, and whether you are including any off-site habitat (also referred to as offsets).

4.16 The A-1 'On-site habitat baseline' tab allows you to enter data for the area habitats that are already present on your site. This allows you to describe the habitats as they are before the intervention takes place. You will need to select or enter information for columns marked A – I, as indicated below in Figure 4-4.

FIGURE 4-4: 'A-1 Site habitat baseline' tab

A: Broad habitat

4.17 Starting at the top of the 'Broad habitat' column, click the arrow to the right of each empty white cell to reveal the broad habitat categories available. Select the appropriate broad habitat that you wish to enter data for.

B: Habitat type

4.18 Under the column heading 'Habitat type', use the arrow to the right of the cell to reveal the habitat type options within the broad habitat selected.

4.19 Once a habitat type has been selected, the distinctiveness and distinctiveness score of the habitat type will be displayed in the columns to the right.

4.20 It is good practice to put different habitat parcels on your site into different rows (e.g. recording two separate parcels of woodland on a site in two separate rows). However, multiple parcels of the same habitat on the same site and in the same

condition can be amalgamated into one row provided that they are treated in the same way post development/intervention.

> **Top Tip:** The individual habitat dropdown list will be blank unless a broad habitat is entered, and you will not be able to select a habitat if a broad habitat is not selected first.

C: Area

4.21   Once the habitat type has been selected, enter the area, measured in hectares, of that habitat into the 'Area' column of the same row.

4.22   Users can enter habitat area to more than two decimal places. There is no set limit to how many decimal places can be used in inputs, but the 'Total area' at the bottom of the 'Area' columns will not display more than two decimal places.

4.23   If the development site includes Urban trees, simply enter the number of each size of tree in the Urban tree helper on the 'Main menu' tab of the metric. This will generate a figure in hectares which should then be entered into the baseline sheet. This process should be repeated for trees of different condition, which should be entered on separate rows in the metric. This is further explained in Section 7.11of this document.

D: Condition

4.24   Using the relevant information (see 3.12, Step 3), select the habitat condition for each row of habitat using the dropdown list in the 'Condition' column. The tool will then automatically apply the corresponding condition score.

4.25   The choice in the condition dropdown list is dependent on the type of habitat entered. The list of condition options will therefore not be revealed until a habitat type is selected.

4.26   If two parts of the same habitat differ in condition, they should be split across two rows and recorded as two separate parcels.

> **Top Tip:** If a score for condition is shown as 'not possible', it means that the habitat type is not compatible with the selected condition state. This can occur if the habitat type has been changed to one that is not compatible after assigning a condition. To remedy this, simply change your condition input and the error message will disappear.

4.27 Under the column heading 'Strategic significance', use the arrow to the right of the cell to reveal the options.

4.28 Select the option for each habitat that best corresponds to information set out in local plans or policies for that particular habitat and its location. The tool will then automatically apply the corresponding strategic significance score.

4.29 Strategic significance should be considered separately for each individual habitat entry in the metric and not on a site-wide basis. Habitat not specified in some form of strategy, map or plan for that area should not be considered strategically significant.

- Where a specific habitat that has been named as important within a local strategy or where the location has been identified as being ecologically important for creating/enhancing that habitat within a local strategy then the option 'Formally identified in a local strategy' should be selected.
- When no such strategy exists, or the area in question does not fall within the local strategy, professional judgement may be used to determine whether a habitat should be identified as 'Location ecologically desirable but not in a local strategy' and justification provided. See 5.16 and 5.24 for more detailed guidance on strategic significance.
- If no such strategy is available **and** there is no evidence to suggest that the habitat is of strategic significance (as outlined above), select 'Area/compensation not in local strategy/no local strategy'.

Top Tip: Consider strategic significance separately for each individual habitat entry in the metric and not in a blanket fashion on a site-wide basis. Only habitat specified in some form of strategy, map or plan for that area should be identified. If a strategy, map, or plan identifies an area as ecologically significant without specifying particular habitats, all habitats occurring within that area should be identified as 'Formally identified in a local strategy'.

F: Suggested action to address habitat losses (no input required)

4.30 The 'Suggested action' column gives indicative advice regarding action to take when habitats are lost (see Figure 4-5). These are based on the distinctiveness band attributed to each habitat and the habitat trading rules associated with the metric. Trading rules within the metric are detailed in full in section 6.7 – 6.8.

Distinctiveness categories		
Distinctiveness category	**Distinctiveness score**	**Sugested action**
V.High	8	Bespoke compensation likely to be required ⚒
High	6	Same habitat required =
Medium	4	Same broad habitat or a higher distinctiveness habitat required (≥)
Low	2	Same distinctiveness or better habitat required ≥
V.Low	0	Compensation Not Required

FIGURE 4-5: Metric tool suggested actions based on habitat distinctiveness

4.31 Some particularly biodiverse (i.e. high distinctiveness) habitats require 'like for like' compensation if lost, and trading down in distinctiveness should always be avoided (see Chapter 2, rules and principles 2.21, Rule 3); this means not replacing biodiverse habitats with large areas of less biodiverse habitats.

4.32 Biodiversity metric 3.1 is not designed to adequately address losses of very high distinctiveness habitat or irreplaceable habitat. If very high distinctiveness habitat entered into the metric is lost, then the metric will highlight that losses of very high distinctiveness habitats are likely to require an agreement for bespoke assessment and compensation. An 'unacceptable loss' error message will flag until a 'yes' is entered into the 'Bespoke compensation agreed for unacceptable loss' column. Reference to the bespoke measures should be provided in the notes.

Note: any losses to very high distinctiveness habitats are removed from the baseline and any bespoke measures to address such losses should be given wider consideration outside the scope of the metric (i.e. these should not be included within the post-development sections of the metric)."

4.33 If all the very high distinctiveness habitat can be retained or enhanced, enter the whole area of habitat to be retained or enhanced (see following section, G). The tool will then calculate the value of the retained or enhanced habitat.

Top Tip: An error flag will be generated if a very high distinctiveness habitat is entered into the metric unless it is retained, enhanced or it is confirmed that bespoke compensation has been agreed. To resolve this, enter the area to be retained/enhanced or if the habitat is being lost confirm that bespoke compensation has been agreed (see G and H below and Figure 4-4 above).

<u>G: Enter area retained and enhanced</u>

4.34   For each line where habitat data is entered on the baseline tabs, the metric will assume that they will be lost unless an area is entered in the retained or enhanced cells (see Figure 4-6).

4.35   Record how much, in hectares, of each habitat on the site is planned to be:

Area retained: Kept on the site and maintained in the same condition throughout any development or landscaping process and featuring in final site designs.

Area enhanced: Kept on the site throughout any development or landscaping process but enhanced (i.e. improved for wildlife) as part of the site design.

Suggested action to address habitat losses	Ecological baseline		Retention category biodiversity value					
	Total habitat units		Area retained	Area enhanced	Baseline units retained	Baseline units enhanced	Area habitat lost	Units lost
Bespoke compensation likely to be required ✂	27.60			1	0.00	27.60	0.00	0.00
Same habitat required =	20.70			1	0.00	20.70	0.00	0.00
Same broad habitat or a higher distinctiveness habitat required (≥)	13.80			1	0.00	13.80	0.00	0.00
Same distinctiveness or better habitat required ≥	6.90			1	0.00	6.90	0.00	0.00

FIGURE 4-6: Input cells for area retained/enhanced on 'A-1 Site habitat baseline' tab

4.36   The tool will use this information at later stages to automatically fill in baselines for habitat enhancement, so it is important to record these areas correctly.

Top Tip: If any of the habitat entered in the on-site or off-site baseline tabs is proposed for enhancement, ensure the expanded rows and columns view is used in the enhancement tab until all the baseline data is entered.

<u>H: Bespoke compensation agreed (only applicable to very high distinctiveness habitat)</u>

4.37   Unless all very high distinctiveness habitats can be retained or enhanced, bespoke compensation (or confirmation that it is not required) should be agreed with the relevant decision maker (e.g. a planning authority). Once this has been agreed, select 'Yes' on the dropdown list in the 'Bespoke compensation agreed' column.

4.38   See section 2.22 before applying the metric calculation tool to any site that includes irreplaceable habitat.

4.39   At the end (right) of each row there is a pair of comment boxes where text can be added (if required). This provides an opportunity for assessors and reviewers to make any comments relating to a specific habitat parcel. For example, this could include the justification for using an intermediate condition score, or providing additional information about why a particular habitat type has been selected.

> **Top Tip:** Use this section to record any additional justifications for the assessment of habitat type, condition or location if needed. The assessor should avoid duplication of evidence / information provided in the condition assessment sheets unless there is specific reason or additional considerations.

Hedgerow, lines of trees and rivers and streams - baselines

4.40   If the site does not contain these habitats, proceed to Step 3. If the site contains hedgerows and/or lines of trees, or rivers, streams, canals or ditches, you should complete the relevant tabs of the metric calculation tool for these habitats. For lines of trees use the 'Hedgerow baseline' buttons and tabs. Use the 'Main menu' to navigate to tabs B-1 and C-1.

4.41   Enter the relevant data for these habitats, as you would for area (non-linear) habitats. However, habitat extent should be recorded as length in kilometres of the habitat feature rather than the area in hectares.

Step 3: Post-intervention data entry

Navigating the post-intervention data entry tabs

4.42   Tabs 'A-2 Site habitat creation' and A-3 Site Habitat enhancement' are found within the 'On-site post development' section of the main menu. These sections allow you to describe the target habitat outcomes post-intervention.

4.43   The post-intervention tabs you will need to complete will depend on the type of habitats you include in your designs, and whether you are creating habitats or enhancing habitats.

4.44   After entering data for the habitats that will be created return to the 'Main menu' and select the 'A-3 Site Habitat enhancement' also found within the 'On-site post development' section.

New habitat created in advance of loss

4.45   Biodiversity metric 3.1 rewards habitat creation in advance by reducing the difficulty and temporal risk multipliers applied. This reflects the lower delivery risk; there is less risk of failure when a habitat is already making progress towards its target condition.

4.46   If work to create a habitat has been started in advance of the impact it is compensating for, the number of years between these dates should be entered the 'Habitat created in advance' column (rounded up). The tool then adjusts the temporal multiplier to reflect a lower delivery risk.

4.47   Once a habitat (established in advance) has passed the predetermined timescale for poor condition for that specific habitat, the metric tool will apply the predetermined difficulty risk associated with enhancing rather than creating that habitat (which carries a lesser risk).

4.48   Once a habitat has been established for long enough to meet the predetermined timescale to reach the desired condition, and that target condition is achieved, then the temporal and risk multipliers are neutralised.

4.49   Evidence of the advance habitat creation work is likely to be required by the relevant determining authority/decision maker.

4.50   If no habitat creation works will be undertaken in advance, the cell can be left blank or '0' can be selected.

Delay in starting habitat creation

4.51   This function should be applied if there will be a significant delay in the creation of a habitat relative to any losses of on-site habitats. For example, to account for delays due to phased developments and developments that temporarily require parts of the development site for construction purposes (see 5.47 – 5.49 regarding short term habitat losses which may be considered temporary).

4.52   Enter the number of full years that the creation will be delayed into the 'Delay in starting habitat creation' column. The number of years entered here will be added to the pre-populated time to target condition and increase the effect of the risk multiplier accordingly.

4.53   Any delays to habitat works should be discussed and agreed with the relevant consenting body, and then entered as appropriate into the calculation tool.

4.54   If there will be no delay, the cell can be left blank or a '0' can be selected.

> **Top Tip:** If a value greater than 0 is entered in both the advance creation and the delayed creation cells for the same row the metric will generate an error and will not proceed with the calculation. Select either the advance creation or the delayed creation but not both.

Tab A2: On-site habitat creation

4.55   This tab allows you to enter the data for the habitats which you plan to create in the same way as is done for the baseline assessment. The tool will then automatically apply the appropriate difficulty and temporal risk multipliers for each created habitat and calculate the number of biodiversity units generated.

4.56   If a score for condition is shown as 'Not possible' it means that the habitat type is not compatible with the selected condition state. The tool will resolve once a valid post-intervention condition has been set.

4.57   At the far right of each row there is a comments box which provides an opportunity for assessors and reviewers to make any observations, comments or provide evidence.

Top Tip: Use the comments box to provide a brief rationale for an action or some additional context. For example, to justify why a particular condition was chosen.

4.58   The metric cross checks for discrepancies between the baseline and post development site areas. An error flag is triggered if the total areas for baseline post-intervention habitats do not match. A tolerance of 0.01 hectare has been built into the tool to avoid unnecessarily triggering an error message due to rounding errors and mapping inaccuracies.

Top Tip: An error flag is triggered there is a discrepancy bigger than 0.01ha that needs to be addressed. This tolerance should not be intentionally used to manipulate unit outputs.

If the flag is raised, check the area of habitat entered into the tool for errors. Use the comments box for the relevant habitat to provide a brief rationale for an action or some additional context if there is a good reason why there is a discrepancy.

Tab A-3: On-site habitat enhancement

4.59   This tab allows you to enter the data for the habitats which you plan to enhance in the same way as is done for the baseline assessment. The tool will then automatically apply the appropriate difficulty and temporal risk multipliers for each habitat and calculate the number of biodiversity units generated.

4.60   When you enter the area of habitat being enhanced into the 'Area enhanced' column of the on-site or off-site baseline tabs, the tool will automatically list the habitats you plan to enhance on the corresponding habitat enhancement tab, using the data you first put into the baseline tabs (See Figure 4-4).

Top Tip: If the baseline data is not appearing correctly in the enhancement tab, check that you entered an area in the corresponding 'Area enhanced' column of the baseline sheets A-1 etc. (see Figure 4-4).

4.61   The existing habitat is the starting point for habitat enhancement and the tool tracks changes in both distinctiveness and condition between the baseline and the proposed outcome. If a trading down (see Rule 3) error occurs it will prevent the tool calculating a value until it is resolved.

Top Tip: If a trading error occurs in either the distinctiveness or condition change cells in the enhancement tab the tool will not calculate a value. To resolve the error, change the proposed habitat or proposed condition.

Condition must stay the same or improve, even when enhancement to a higher distinctiveness habitat is proposed, or an error will be generated.

4.62   The 'Broad habitat' and 'Habitat type' cells are pre-populated automatically with the habitats that were entered at the baseline, when a figure was inserted in the 'Area enhanced' cell on the 'Baseline' tab.

4.63   These cells are white and optionally editable should the user wish to enhance a habitat to a higher distinctiveness habitat within the same broad habitat.

4.64   Changing to a different broad habitat type would generally be considered as habitat creation not enhancement (see Box 5-3). If enhancement across broad habitats is recorded this must be ecologically justified as enhancement and the reasoning explained in the 'Assessor comments' cell.

Step 4: Off-site data entry

4.65   Off-site tabs can be used to calculate the contribution of any off-site changes towards a project's overall biodiversity change (loss or gain) calculation. The terms 'on-site' and 'off-site' are defined in Chapter 3.

4.66   Off-site data is entered into the tool in the same way as outlined for on-site data tabs (Steps 2 and 3). However, for habitat creation and enhancement undertaken off-site, there is an additional spatial risk multiplier which takes account of the proximity of the on and off-site locations. More information on the spatial risk multiplier and how to apply it is provided in sections 5.51 – 5.55.

Step 5: Viewing and interpreting the results

4.67   From the 'Main menu', select the 'Results' button located in the top right-hand side of the page. The results are presented in three ways: Headline results; Detailed results and Habitat trading summary.

4.68 Use the Headline results to see the overall net changes in biodiversity units and refer to the Detailed results and Habitat trading summary to understand the see the proposed changes in terms of habitats and areas.

> **Top Tip:** Results for habitats based on an area measure are not comparable with those based on a linear measure and therefore need to be accounted for separately.

Headline results tab

4.69 The Headline results tab provides a high-level summary and highlights whether biodiversity losses or gains have been achieved across the area and linear metrics relevant for the project.

4.70 It displays both on-site and off-site data in biodiversity units for baseline and post-intervention states. The Headline results also provide a summary of the project-wide change in both biodiversity unit value and percentage change.

> **Top Tip:** If the Broad habitat and Habitat type cells are not pre-populated it may be because you have over-ridden the pre-population function. Download a new version of the metric or manually enter the correct habitat.

4.71 'On-site net % change' identifies the net gain or loss as a percentage of the on-site baseline. The combined on and off-site net gain or loss is displayed under 'Total on-site net % change plus off-site surplus'.

4.72 When a habitat has no baseline unit value and new habitat is created, the percentage increase is displayed as 100% net change. In these scenarios check for locally defined unit targets which should be considered in addition to these percentage increases.

4.73 At the bottom of the headline results tab is a 'Trading summary met' box. If the trading summary is not met, see the detailed results and trading summary tabs to understand why.

4.74 The results for hedgerows and rivers are displayed separately from habitats based on an area measure and should be reported on separately.

> **Top Tip:** If habitat enhancement units are not included in the Headline results check all the data in the enhancement tab has been entered correctly.

Detailed results tab

4.75 The detailed results provide a more comprehensive picture of the habitat changes. They also display both on-site and off-site data in biodiversity unit values, and overall changes in habitat area/length.

4.76   Data for habitats based on an area measure are displayed at the broad habitat level. Data for hedgerows and rivers are displayed by hedgerow type and river type.

<u>Habitat trading summary tab</u>

4.77   The 'Trading summary' tab provides details of trading between habitat types and an indication of whether the development has abided by the trading rules (see 2.21, Rule 3).

4.78   The trading summary avoids the need to track the changes in habitat type and condition on an individual parcel-by-parcel basis (which is not practical, particularly on larger sites).

4.79   Instead, the trading summary draws aggregated data from other parts of the tool and presents the data in a way that allows assessors and reviewers to understand the habitat changes in each distinctiveness band and determine whether or not trading principles described in Rule 3 have been adhered to.

Top Tip: If a habitat is highlighted amber there are losses in that habitat type or broad habitat group. If the trading rules are not satisfied, amber highlighted habitats identify where the error is occurring.

<u>Error checking</u>

4.80   The tool contains several inbuilt error messages which are designed to identify errors in data entry. Typically, they can be resolved by checking the input data and common causes of errors include:

- Inappropriate condition ratings;

- Habitat areas that do not match;

- Aiming to create a habitat or condition type that is not considered ecologically feasible; and

- Incomplete/missing data for example if an area of habitat is identified as being enhanced in the baseline, but no data has been entered in the enhancement tab.

Step 6 (optional): understanding and checking supporting data in the tool

4.81   An understanding of the full data sets that drive the tool is not required, but underlying data is available and can be used to better understand the tool's outputs. All the technical data and multipliers underpinning the calculation can be accessed by clicking the 'Technical data' button on the 'Main menu'.

4.82   Tabs G-1 to G-9 of the calculation tool provide details of the habitats within the metric and associated technical data such as distinctiveness bands and risk multipliers.

4.83   The 'Technical data' tab also contains a 'Translation tool' which enables the conversion of habitat types between Phase 1 and UKHab typologies.

5: Detailed description of biodiversity metric 3.1

5.1. This chapter focuses on the key components which apply to all three habitat unit calculations in biodiversity metric 3.1 – area habitats, hedgerows and lines of trees and rivers and streams. It focuses on the values used for different multipliers, why those multipliers are used, and the assumptions and limitations around them. It also outlines some considerations when designing a project being assessed with the metric.

5.2. Chapter 6 provides further detail regarding area habitat biodiversity unit calculations. How to assess Urban trees is detailed in Chapter 7.

5.3. Chapters 8 and 9 provide explanation for the calculation of linear units, covering hedgerows and lines of trees and rivers and streams.

Components of biodiversity quality

Distinctiveness

5.4. A combination of simple rules and expert judgement have been used to assign each habitat type a distinctiveness band. Their derivation and application to different habitats is explained in more detail in Part 2 of the Technical Supplement

5.5. Distinctiveness is based on the type of habitat and its distinguishing features including consideration of species richness, rarity (at local, regional, national and international scales), the extent to which it is protected by designations and the degree to which a habitat supports species rarely found in other habitats (see Table 5-1 for more details).

TABLE 5-1: Area habitat distinctiveness categories and multiplier scores (excluding intertidal habitats)

Category	Score	Definition
Distinctiveness categories		
Very high	8	• Priority Habitats as defined in Section 41 of the Natural Environment and Rural Communities (NERC) Act that are highly threatened, internationally scarce and require conservation action, e.g. blanket bog. • Small amount of remaining habitat with a high proportion unprotected by designation. • Endangered or critical European red list habitats.
High	6	• Priority Habitats as defined in Section 41 of the NERC Act requiring conservation action, e.g. lowland fens. • Remaining Priority Habitats not in very high distinctiveness band and other red list habitats.
Medium	4	• Semi-natural habitats not classed as a Priority Habitat but with significant wildlife benefit, e.g. mixed scrub. • Arable field margins (Priority habitat) only.
Low	2	• Habitat of low biodiversity value e.g. temporary grass and clover ley. • Agricultural and urban land of lower biodiversity value.
Very low	0	• Little or no biodiversity value e.g. hard standing or sealed surface.

Intertidal habitats

5.6. Distinctiveness bands are assigned to intertidal habitats at broad habitat[28] level and reflect their nature conservation importance and ability to support biodiversity. Most naturally occurring intertidal habitats are of high nature conservation value, whether or not they occur within the boundary of a protected site and have therefore been assigned a distinctiveness level of **'high'** to reflect this.

5.7. In the intertidal zone, artificial habitats need to be considered within the metric and distinguished from the naturally occurring versions of those habitats. Hence, artificial counterparts of the natural habitats have been included within the metric with a distinctiveness score of **'low'** (or in the case of 'Artificial hard structures with

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[28] Habitat descriptions based on the assertion that benthic communities are strongly influenced by the physical characteristics of the seafloor (e.g. type of sediment, or slope) and the water column (e.g. temperature or water movement). VASQUEZ, M. ET AL. (2015) Broad-scale mapping of seafloor habitats in the north-east Atlantic using existing environmental data. *Journal of Sea Research* [online]. 100. Available from: Broad-scale mapping of seafloor habitats in the north-east Atlantic using existing environmental data - ScienceDirect

Integrated Greening of Grey Infrastructure (IGGI)' **'medium'**) to reflect their origin. It is acknowledged that in some circumstances these artificial habitats are only of slightly lower value than their naturally occurring counterparts and, in those cases, the condition parameter should be used to reflect this, by giving them a '**good**' condition score, to increase their overall biodiversity value in the metric. This should be justified in the 'Assessor comments' column.

5.8.   It is important to note that when intertidal habitats have been restored by re-establishing natural processes, the resulting habitat will be considered 'natural' (i.e. coastal lagoons, saltmarshes and saline reed beds). For example, managed realignments are largely created by breaching artificial sea defences, to restore tidal inundation and other processes that lead to the development of a range of natural intertidal and transitional habitats.

5.9.   Table 5-2 shows the distinctiveness categories and scores for intertidal habitats in the metric.

TABLE 5-2: Intertidal habitat distinctiveness categories and scores

Category	Score	Habitat type
Very high[*]	8	Natural habitats on bedrock including peat, clay or chalk
High	6	Most other naturally occurring intertidal habitats
Medium	4	- Artificial hard structures with Integrated Greening of Grey Infrastructure (IGGI) - Littoral coarse sediment - Littoral sand
Low	2	All other artificial habitats

<u>Linear Habitats</u>

5.10.   The distinctiveness categories for 'hedgerows and lines of trees' and 'rivers and streams' are explained in Chapter 8.

Condition

5.11.   Biodiversity metric 3.1 uses habitat condition as one of the measures of habitat **quality**. Biodiversity metric 3.1 measures a habitat parcel against the ecological optimum state for that particular habitat and is a means of measuring variation in the quality of patches of the <u>same</u> habitat type (i.e. an 'intra-habitat' measure). Condition is often linked to past and present management and land use, for example a site may be assessed as calcareous grassland in poor condition due to a lack of management and presence of invasive non-native species, but by reintroducing grazing and eradicating the invasive species it could achieve a higher condition score.

5.12. To determine condition the assessor must apply the biodiversity metric condition assessments. This process of assessing habitat condition is tailored to habitat type and considers whether a habitat meets a number of criteria relating to key physical characteristics of that habitat and its ability to support typical species. Condition assessments can be found within the Technical Supplement and their use is explained in detail in Part 1 of the Technical Supplement.

5.13. The condition categories available for all area habitats, including intertidal habitats, are as set out in Table 5-3 below.

TABLE 5-3: Condition categories and multiplier scores for area habitats

Condition categories	
Category	**Score**
Good	3
Fairly good	2.5
Moderate	2
Fairly poor	1.5
Poor	1

Intertidal habitats

5.14. For intertidal habitats condition is assigned using a set of condition indicators for each broad habitat type: rocky shore, intertidal sediments, littoral biogenic reefs, littoral seagrass, coastal lagoons, saltmarsh and artificial hard structures. Condition is assessed against a generic set of criteria tailored to each habitat type. The scores achieved against each criterion are then summed to derive an overall condition score, as in Table 5-3 above.

Linear habitats

5.15. The condition categories for 'hedgerows and lines of trees' and 'rivers and streams' are explained in Chapter 8.

Strategic significance

5.16. The strategic significance of a habitat is treated as a component of the quality of a habitat parcel in the same way as distinctiveness and condition.

5.17. Strategic significance relates to the spatial location of a habitat parcel and works at a landscape scale. It gives additional biodiversity unit value to habitats that have been identified as habitats of strategic importance to that local area.

5.18. Strategic significance utilises published local strategies and objectives to identify local priorities for targeting biodiversity and nature improvement, such as Local Nature Recovery Strategies[29], local biodiversity plans, National Character Areas[30] objectives, Local Planning Authority Local Ecological Networks[31], Shoreline Management Plans[32], estuary strategies and green infrastructure strategies.

5.19. Table 5-4 shows the multiplier scores that apply across all pre- and post-intervention and on- and off-site calculations, based on the habitat type and its location, depending on their status in a local plan, strategy or policy. These apply to all habitats except rivers and streams; the strategic significance categories for these are explained in Table 8-6.

TABLE 5-4: Strategic significance categories and scores

Category	Score
High strategic significance • High potential - area/action formally identified within a local plan, strategy or policy.	1.15
Medium strategic significance • Good potential - location ecologically desirable but area/action not identified in local plan, strategy or policy.	1.1
Low strategic significance • Low potential - area/action not identified in any local plan, strategy or policy; or • No local strategy in place.	1

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[29] See: ENVIRONMENT ACT 2021. (c30). London: The Stationery Office. [online]. Available from: Environment Act 2021 (legislation.gov.uk)

[30] See: NATURAL ENGLAND (2014) *National Character Area profiles* [online]. Available from: National Character Areas

[31] See: DLUHC (2019). *Natural Environment* [online]. Available from: Natural environment - GOV.UK (www.gov.uk). This guidance requires Local Planning Authorities to plan strategically for nature, identifying and mapping ecological networks in order to deliver the protection, enhancement and maintenance of biodiversity. These local ecological networks can make a significant contribution to developing the Nature Recovery Network.

[32] See: ENVIRONMENT AGENCY (2019) *Shoreline Management Plans (SMPs)* [online]. Available from: Shoreline management plans (SMPs) - GOV.UK (www.gov.uk). An SMP is a non-statutory document developed by Coastal Groups, local authorities and the Environment Agency for areas based at Policy Units. These units are defined on natural sediment movements and coastal processes, rather than administrative boundaries. SMPs offer guidance to recommend strategic and sustainable coastal defence policy options for reducing long term risks to people and natural environments.

5.20. Strategic significance will be high if the habitat location is identified in local plans, strategies or policies. Medium strategic significance can be used where professional judgement is applied and the location is deemed ecologically desirable for a particular habitat type, whether recorded in the site baseline, being created or enhanced. Where professional judgement is applied in this way, the decision should be justified, and evidence provided.

5.21. For example, if woodland is planted in an area that has been identified in a Local Nature Recovery Strategy as a strategic corridor between two existing areas of woodland it would be of high strategic significance; if the same location was not recognised in a local plan or strategy but the woodland would still create a strategic corridor this would be of medium strategic significance; if the woodland was in a location not recognised in a local plan or strategy and was isolated from other woodland habitat it would be of low strategic significance.

5.22. Available datasets can be used to identify the relevance of a specific location for certain habitat types (Box 5-1).

5.23. When either high or medium strategic significance is used the user should complete the 'Assessor comments' section of the metric calculation tool to justify why a habitat in a particular location warrants that level of strategic significance.

5.24. In the absence of any locally or nationally relevant strategic document indicating areas of significance for biodiversity, or robust ecological justification for a medium score, a **low** strategic significance score should be used by default in all pre- and post-intervention calculations. A low strategic significance score does not penalise a proposal as it results in a multiplier of x1 being applied and the score remaining unchanged.

Top Tip: If a habitat of the same type and condition is intersected by a boundary between two areas of differing strategic significance, the habitat parcel should be split into two.

Box 5-1: Example datasets that could be used to determine strategic significance

- **Identifying sites suitable for marine habitat restoration or creation** (MMO1135):

  A project managed by the Marine Management Organisation (MMO) to create a national dataset of sites that are suitable for habitat restoration or creation. This includes the Saltmarsh Restoration Potential Map, which identifies areas where managed realignments could take place to create new intertidal habitat.

- **REMEMARE – restoring meadows, marsh and reef:**

  Restoration potential maps for native oyster habitat and seagrass beds. These maps predict areas where oyster and seagrass restoration are likely to be most successful based on physical parameters and seabed type.

Dealing with risk

5.25. There are uncertainties and a risk of failure in any action to create or improve the biodiversity unit value of a habitat. Where it is not possible to complete the habitat creation or improvement works in advance of the habitat losses occurring (sometimes referred to as habitat 'banking') risks need to be mitigated.

5.26. Risks are recognised in the metric by reducing the number of units generated by an area of compensation habitat. This is done using **multipliers** in the metric to account for the predicted level of risk or uncertainty. The use of multipliers to account for the risks associated with habitat creation or enhancement has several benefits:

- It **provides flexibility** by allowing activities impacting habitats to proceed in advance of new or enhanced habitats being provided or attaining their target quality, in exchange for an increase in the number of biodiversity units required.

- It **incentivises** the creation of habitats in advance of loss. If the habitat is established before the impact, then there is no need to apply risk multipliers to manage delivery risks or to take account of time differences. More units will therefore be available from a specific parcel of land.

- It **creates a disincentive** against damaging habitats that are either difficult or take a long time to create or restore (the case for many habitats in the high distinctiveness band), by increasing the area of habitat needed to offset any loss. (N.B. See section 2.27 for application of the metric to irreplaceable or very high distinctiveness habitats).

5.27. A typical consequence of applying risk multipliers is to increase the size (e.g. area or length of linear features) of habitat required to offset losses such that it exceeds the size of habitat lost or damaged. This is necessary to:

- Preserve the incentives and disincentives referred to above;

- Account for temporal losses of biodiversity (e.g. where there is a period of diminished biodiversity between the point in time when a habitat is impacted and when it is replaced by habitat of equivalent biodiversity value); and

- Avoid situations where habitats that are created, enhanced or restored fail to adequately offset the lost biodiversity.

5.28. The following three risks are recognised in this metric:

- Difficulty;

- Time to target condition; and

- Spatial risk.

Difficulty of creation and enhancement/restoration

5.29. This risk associated with delivery of biodiversity creation or enhancement, is applied to represent the uncertainty in the effectiveness of management techniques used to restore or create habitat. The various difficulty categories and associated multiplier scores are shown in Table 5-5.

5.30. The level of risk differs between habitat types because of ecological factors (e.g. the different challenges posed by creating different habitat types) and due to the availability of techniques or knowledge of how to create habitats in a realistic

timeframe. This uncertainty in achieving the target outcome for each habitat is addressed by a habitat-specific 'difficulty' multiplier based on available science and expert opinion. There are two separate difficulty multipliers assigned to each habitat, one for creation and one for enhancement/restoration (recognising that the technical challenges may not be the same for both).

5.31. There is a growing body of experience and expertise associated with habitat creation and enhancement[33]. Nevertheless, it is important to recognise that it is impossible to exactly replicate habitats lost, because of the unique physical and ecological features of every place. This point is of particular relevance to impacts on well-established, high quality semi-natural habitats and emphasises why it is so important that the mitigation hierarchy is adhered to, so that impacts on such habitats are minimised and occur only when there is no alternative. A precautionary approach has therefore been taken in the assessment of the difficulty of habitat creation based on the best available evidence.

TABLE 5-5: Difficulty categories and multipliers

Difficulty categories	
Category	**Multiplier**
Very high	0.1
High	0.33
Medium	0.67
Low	1

Temporal risk

5.32. After an impact there is a deficit of biodiversity as mitigation and compensation habitats mature. This issue can be managed by the creation of alternative habitat ahead of the impact taking place, e.g. by starting the offset work well ahead of a development, or through the creation of a bank of habitat units.

5.33. However, this is not always possible and, even where the management to create replacement habitat starts in advance, the time taken for habitats to mature means that there will almost inevitably be a time lag between the two. Where a time lag does occur, a temporal risk multiplier is applied. This is referred to as the '**Time to target condition'** multiplier.

5.34. The time period used in applying the 'Time to target condition' multiplier to a metric calculation is the length of time (in years) between the intervention and the point in time when the habitat reaches the pre-agreed target quality (i.e. distinctiveness,

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[33] As the evidence base on the effectiveness of creation and restoration techniques grows and is reviewed the risk multipliers may be modified and incorporated into future revisions to the metric.

condition). This time will vary between habitat types, between change scenarios (i.e. creation typically taking longer than enhancement) and due to how the habitat is managed. Time to target condition values, based on the **average time** taken to achieve a desired outcome, assuming good practice and typical conditions, are provided for all habitats used in biodiversity metric 3.1. These values are set out in detail in Part 3 of the Technical Supplement.

5.35.   These times to target condition have a 'discounting rate' applied to them to generate the multiplier value which is used in biodiversity metric 3.1. 'Discounting' over time is an economic technique used to compare costs and benefits that occur in different time periods based around the principle that, generally, people prefer to receive goods and services now rather than later. Where time discounting is used a standard discount rate is typically applied. Biodiversity metric 3.1 uses 3.5%, which is the value recommended in the Treasury Green Book[34]. Table 5-6 shows the multipliers for a number of time periods between one and 30 years, using a discount rate of 3.5 %. It is important to use precise figures (at least to three decimal places).

5.36.   Biodiversity metric 3.1:

- **Assumes a quality 'jump' from the baseline condition to the target condition** once the relevant number of years have elapsed. Metric calculations do not consider incremental increases in quality of the habitat and do not need to be re-calculated annually.

- **Sets a limit on the discount rate used for temporal risk**. The metric sets a multiplier limit of x 0.320 to take account of temporal risk. This equates to a period of +30 years, which is the maximum time frame that most projects and plans can realistically plan ahead, and beyond which the multiplier reduces very slowly. This +30 year value is applied to all scenarios where the time required to reach the target condition exceeds 30 years. If the time for habitat to reach target condition exceeds 30 years, consider if this is the most appropriate intervention.

5.37.   Post-development outcomes should be set and entered into the metric within a timeframe appropriate to the scope of the project. As the metric is an auditing tool with a wide variety of uses, project timeframes will vary depending on the objectives of the specific project and the framework in which the project is delivered. For example, if ecological outcomes are set within a framework of a 30-year legal agreement, then post-development outcomes (i.e. habitat type/condition) should be entered within the metric in the context of this 30-year timeframe.

5.38.   At appropriate stages through a project lifecycle, monitoring is required to confirm if habitat type and condition achieved matches the habitat outcomes proposed within the post-development sections of the biodiversity tool.

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[34] More details on discounting can be found in: HM TREASURY. (2022) *The Green Book.* TSO, London.

TABLE 5-6: Time to target condition: multipliers for different time periods using a 3.5% discount rate.

Time to target condition			
Time (years)	**Multiplier**	**Time (years)**	**Multiplier**
0	1.000	16	0.566
1	0.965	17	0.546
2	0.931	18	0.527
3	0.899	19	0.508
4	0.867	20	0.490
5	0.837	21	0.473
6	0.808	22	0.457
7	0.779	23	0.441
8	0.752	24	0.425
9	0.726	25	0.410
10	0.700	26	0.396
11	0.676	27	0.382
12	0.652	28	0.369
13	0.629	29	0.356
14	0.607	30	0.343
15	0.586	>30	0.320

Accounting for habitat creation in advance and delays in starting habitat creation

5.39. Biodiversity metric 3.1 recognises that there will be situations where there is a mismatch between a negative impact on biodiversity occurring and work to create or enhance the 'post-intervention' habitats commencing. This can either be in the form of habitat creation occurring in advance or being delayed beyond the point at which the baseline losses occur. Biodiversity metric 3.1 can account for both.

Note: these functions are available for both on and off-site delivery and for area and linear habitats. Only one of these options may be used for any row in the metric. An error message will be generated if values are entered for both.

5.40. Where habitat creation or enhancement has been started or completed in advance, evidence should be provided to (and approved by) the determining authority. Evidence must be referenced in the 'Assessor comments' row in the metric. Equally, delays in starting habitat creation may be explained within the 'Assessor comments' cell.

5.41. When there is a mismatch between a negative impact on biodiversity occurring and replacement habitat reaching the required quality or level of maturity, there will be an overall loss of biodiversity for a period of time. This can be minimised or even avoided by creation of habitat ahead of the impact taking place, either through the setting up of habitat banks or, for projects with a long lead in time, by starting the offset work well ahead of any habitat losses.

5.42. The 'Habitat created in advance' function enables biodiversity metric 3.1 to account for a reduction in both the time remaining to reach the target condition and the risk of delivery being successful. This occurs when work to create or enhance habitats is started in advance of an intervention/development occurring, including through 'habitat banks'. This function reduces the time to target condition by the number of years since habitat creation or enhancement began and applies an adjusted multiplier to recognise the reduced delivery risk.

5.43. If the input 'number of years created in advance' is between one and the time taken to reach poor condition (which differs for each habitat) then the 'difficulty of creation' multiplier will continue to be applied. However, if the time to reach poor condition has already been reached or exceeded then the 'difficulty of enhancement' multiplier will be applied instead. If the final time to create the desired habitat type and target condition has already been reached, then both the time to target condition and the difficulty of creation risk multipliers will no longer be applied (see Box 5-2).

Delay in starting habitat creation

5.44. There will be circumstances where work to create or enhance the proposed 'post-intervention' habitats cannot start simultaneously to the negative impact on biodiversity occurring. This is most likely to happen with on-site habitat creation, where the area of land allocated for habitat creation is unavailable due to a development taking place and the habitat creation/restoration cannot begin until the development is complete. For example, where the proposed habitat creation is on the route of an existing road which cannot be removed until the new road is completed, or where it is being used as a site compound for a long period of time.

5.45. When habitat creation is delayed significantly beyond the point at which the baseline losses occur the 'Delay in starting habitat creation' function enables biodiversity metric 3.1 to account for the resulting increase in the time remaining to reach the target condition. This function recognises that the risk of failure remains the same as when habitat creation begins concurrently with the loss, so the difficulty risk multiplier is applied.

5.46. The metric calculation tool increases the 'time to target condition' by the appropriate number of years that the habitat creation is delayed and applies the adjusted multiplier. If the length of delay combined with the 'standard' time to target condition exceeds 30 years, then the 30+ years multiplier will be applied (see Box 5-2).

Box 5-2: Examples of how the risk multipliers are applied for 'habitat created in advance' and 'delay in habitat creation' within biodiversity metric 3.1

Habitat created in advance

Habitat / condition	'Standard' time to target condition (TTC) (years)	Time habitat created in advance (years)	Residual TTC applied by metric 3.1	Time to poor condition reached	Difficulty multiplier applied
Lowland meadow / good	15	2	13	No (5 years)	Creation multiplier
Modified grassland / good	7	2	5	Yes (1 year)	Enhancement multiplier
Artificial littoral coarse sediment / moderate	1	2	0	Yes (1 year)	None
Lowland heathland / good	30+	5	25	No (10 years)	Creation multiplier

Delay in starting habitat creation

Habitat / condition	'Standard' time to target condition (years)	Time habitat creation delayed (years)	Combined TTC applied by metric 3.1	Difficulty of creation multiplier applied
Modified grassland / moderate	4	5	9	Yes
Other broadleaved woodland / moderate	15	5	20	Yes
Other broadleaved woodland / good	30+	5	30+	Yes
Upland calcareous grassland / good	25	10	30+	Yes

Accounting for temporary losses

5.47.   There may be situations where a habitat is impacted by an operation for a short period of time (such as trenching for pipeline or cable-laying or turf-stripping) and afterwards the habitat is restored back to its original state. Where a habitat is disturbed for a short period of time, it may be considered temporary loss if specific criteria are met. If these criteria are met, then the habitat may be recorded as 'retained' within the metric tool. The nature of the temporary impact, alongside relevant evidence, must be recorded within the 'notes' section.

5.48. The temporary loss option is <u>only</u> available for disturbed habitats that can be restored (in full) to their baseline condition (or better) within 2 years from the date of impact.

5.49. Where the habitat cannot be restored to its baseline value within 2 years from the date of impact this should recorded as a loss of baseline habitat and creation of the replacement habitat.

Spatial risk

5.50. There are two spatial components in biodiversity metric 3.1:

- **Strategic significance** (outlined in sections 5.15 – 5.23) describes local significance of the habitat or its location and is applied to both pre- and post-intervention calculations. It is important to note that strategic significance is treated as a component of habitat quality rather than a risk.

- **Spatial risk** reflects the relationship between the locations where a biodiversity loss is occurring and where the off-site habitat is being delivered. This risk factor is only applied to the off-site post-intervention calculations.

5.51. <u>The remainder of this section relates only to **spatial risk**</u>.

5.52. There are both ecological and social drivers for off-site habitat to be provided close to where losses occur: e.g. to avoid depleting biodiversity in local areas or to recognise the cultural ecosystem services provided to a local community. For this reason, the metric penalises proposals where the off-site habitat is located at distance from the site of impact.

5.53. The Spatial risk multiplier is applied to off-site habitats which are delivered outside either the local planning authority area, the same National Character Area[35] or Marine Plan Area for intertidal habitats. For rivers and streams the waterbody or catchment is the defining boundary and WFD waterbody and catchment boundaries[36] should be used to determine the Spatial risk. Table 5-7 shows the different spatial categories and associated risk scores for different habitat groupings within biodiversity metric 3.1.

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[35] Further information on National Character Areas can be found at: NATURAL ENGLAND (2014) *National Character Areas* [online]. Available from: <u>Natural England Access to Evidence - National Character Areas</u>

[36] For those rivers and streams too small to form a WFD waterbody in their own right, the 'waterbody' would be defined as the waterbody that the tributary feeds into.

TABLE 5-7: Spatial risk categories

	Variation in spatial risk categories between habitat groups		
Score	**Area habitats** (excluding intertidal habitats) **Hedgerows and lines of trees**	**Intertidal habitats**	**Rivers and streams habitats**
1.0	Compensation <u>inside</u> LPA or NCA of impact site	Compensation <u>inside</u> same Marine Plan Area, or deemed to be sufficiently local, to site of biodiversity loss	Within waterbody
0.75	Compensation <u>outside</u> LPA or NCA of impact site but in neighbouring LPA or NCA	Compensation <u>outside</u> same Marine Plan Area but in neighbouring Marine Plan Area	Within catchment
0.5	Compensation <u>outside</u> LPA or NCA of impact site and beyond neighbouring LPA or NCA	Compensation <u>outside</u> Marine Plan Area of impact site and beyond neighbouring Marine Plan Area	Outside catchment

Biodiversity change scenarios

5.54. Different biodiversity change scenarios carry different levels of risk and the multipliers are applied differently to reflect this. Biodiversity metric 3.1 recognises two distinct habitat change scenarios:

- **Habitat creation** - where one habitat type is replaced by another different habitat, or a habitat is destroyed (e.g. by development works) and the same habitat is recreated elsewhere. An example of habitat creation is planting young native trees and shrubs on an area of arable land to create a new broadleaved woodland.

- **Habitat restoration or enhancement** - where changes are made to an existing habitat to improve its distinctiveness and/or condition (see Box 5-3). Examples of restoration are the transformation of an abandoned calcareous grassland dominated by scrub and coarse grasses to a continuous area of calcareous grassland with isolated woody species and an abundance of fine-leaved grasses, or taking measures to remove mooring impacts from a seagrass bed.

5.55. Under the above scenarios different portions of the biodiversity value of a habitat may have different risk multipliers applied to it. As illustrated in Figure 5-1, in the case of a straightforward habitat creation, you lose all the original habitat, so the risks apply to the whole value of the habitat being created. In the case of restoration or enhancement the habitat already has, and retains, a certain biodiversity value that the enhancement interventions increase. In this scenario, the risk multipliers are only applied to this uplift (improvement) of the habitat.

Creation or recreation of habitat

Restoration or enhancement of habitat

- ⬇ Point at which habitat management intervention commences
- 🟩🟨 Different habitats
- ▨▨ Portion of biodiversity value to which risk multipliers apply
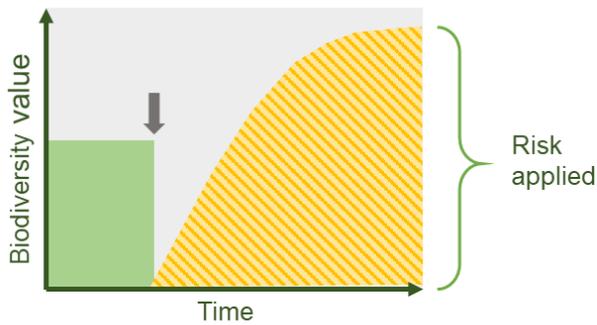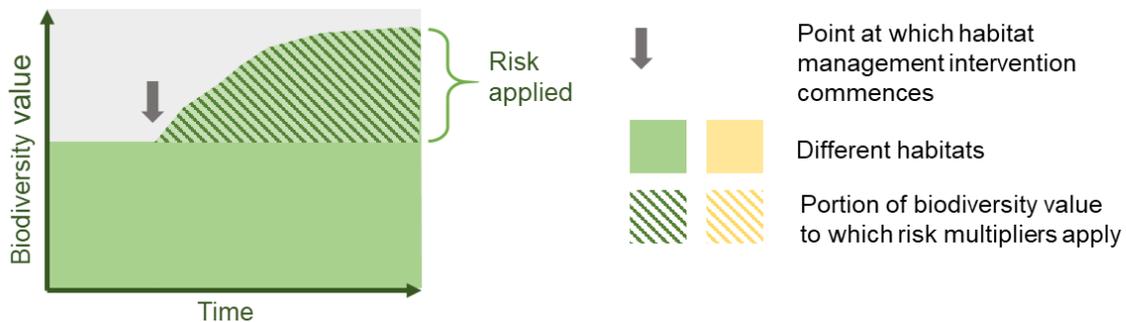
FIGURE 5-1: The two habitat change scenarios recognised in biodiversity metric 3.1

5.56. It is important to select the appropriate change scenario for each management intervention as biodiversity units are calculated differently for these two scenarios. This choice is an ecological judgement and is determined by the ecological consequences of the change, not where the habitat is located (see Box 5-3).

5.57. Habitats can be created, restored or enhanced, on-site as well as off-site. Measures taken to generate biodiversity units by improving existing habitats must provide a significant and demonstrable uplift in distinctiveness or condition.

5.58. Good management practice does not, by itself, constitute restoration or enhancement, though re-instating certain management practices may contribute to achieving it, for example by improving condition.

Box 5-3: When to use habitat creation vs habitat enhancement/restoration

When entering your post-development/intervention information into the metric it is important that you chose the correctly between habitat creation vs habitat enhancement/restoration.

Habitat creation

This will be the change scenario applied to the creation of any new habitats. It will result in the total loss and replacement of the baseline habitat.

The following principles will generally apply:
- There is a change in broad habitat type from baseline to post-intervention (e.g. grassland to woodland, or cropland to urban);
- Requires significant ground preparation and/or seeding is required to establish the proposed habitat (e.g. placement of rocky substrate to facilitate creation of littoral biogenic reefs, or converting arable land to species rich grassland); and
- A habitat which is being lost is recreated, whether on or off-site and regardless of whether its condition is better than that being lost.

Habitat enhancement/restoration

This change scenario should be applied when the proposed intervention will modify an existing habitat to improve its condition or quality. It should only be used in the following three situations:

1. **Improving the condition** of an existing habitat (e.g. from moderate to good condition);

2. **Changing the distinctiveness** of a habitat to another higher distinctiveness habitat **in the same broad habitat type** (e.g. other neutral grassland to lowland meadow, other broadleaved woodland to lowland mixed deciduous woodland); and

3. **Restoring a remnant high value habitat.** Where there are sufficient remnant areas of a high distinctiveness habitat visible on a site, and that it is clear that the habitat can be successfully restored. (e.g. where 'other coniferous woodland' has been planted over heathland or sand dunes[OBJ], or where mixed scrub has developed over lowland calcareous grassland and the original habitat is clearly still present and recoverable.) *N.B. In these cases, evidence to justify the use of the enhancement option must be provided and referenced in the 'Assessor comments' cell in the metric and approved by the determining authority.*

In all other habitat change scenarios the baseline habitat should be assumed to be lost and the replacement, post-intervention habitat will be 'created' for the purposes of the metric.

6: Area habitat biodiversity unit calculations

6.1. Area habitats include woodlands, grasslands, wetlands, coastal, intertidal and other habitat types that are widely recognised by ecologists and the public alike. Recognised habitats comprise a community of different species populations living in a place. There is usually a sub-group of those populations that give a habitat its defining characteristics, for example trees in a woodland or grasses in a meadow.

6.2. There are a variety of habitat classification systems available in the UK, for example Phase 1 (JNCC, 2010)[37], UKHab (UKHab Ltd, 2022)[38] and EUNIS (EAA, 2019)[39]. Biodiversity metric 3.1 uses a combination of these: UKHab for most area habitats, EUNIS for intertidal habitats and WFD lakes typologies for lakes. There are a small number of habitats which have specific biodiversity metric 3.1 definitions (see Table TS2-1).

6.3. UKHab is a unified and comprehensive habitat classification coding system for all terrestrial, freshwater and marine habitats in the UK, designed to provide a simple and robust approach to survey and monitoring and which includes a detailed nomenclature for urban areas. It is flexible enough for use in a wide range of survey types from walkover surveys of small urban sites to regional and national scale rural habitat mapping.

6.4. EUNIS is a comprehensive system developed to facilitate the harmonised description and collection of data across Europe; it covers all habitat types from natural to artificial, and through to the marine (subtidal) environment. The EUNIS habitat classification system is the habitat classification used in reporting across the marine environment in Europe. Alkalinity is the basis of the WFD lakes typology along with peat and marl. Nearly all lakes above 2ha have already been assigned to one of the WFD types using either measured or modelled data. These types can be found on the UK lakes portal[40].

6.5. Calculating the baseline biodiversity unit value of a site uses the area, distinctiveness, condition and strategic significance of each habitat.

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[37] JOINT NATURE CONSERVATION COMMITTEE (JNCC) (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit* [online]. JNCC, Peterborough. Available from: Handbook for Phase 1 habitat survey (jncc.gov.uk)

[38] UKHAB LTD. (2022) *UK Habitat Classification* [online]. Available from: http://ukhab.org

[39] (EEA) (2019) *EUNIS habitat type hierarchical view* [online]. Available from: European Nature Information System

[40] More information can be found on: UK Centre for Ecology and Hydrology (UKCEH) (No date) *UK Lakes Portal* [online]. Available from: UK Lakes Portal (ceh.ac.uk)

Distinctiveness and trading rules

6.6.   As described in Chapter 5, distinctiveness refers to the relative scarcity of a habitat and its importance for nature conservation. The distinctiveness categories used for Area Habitats and examples illustrating the types of habitats assigned to each category are shown in Table 5-1. The distinctiveness category assigned to each habitat type used in biodiversity metric 3.1 is provided in Part 2 of the Technical Supplement (Tables TS2-6 to TS2-17 and summarised in Table TS3-1).

<u>Trading Rules</u>

6.7.   Trading rules which are applied by the metric require that any loss of habitat is replaced on a 'like for like' or 'like for better' principle. The trading rules applied for individual habitats are based on their distinctiveness (see Table 6-1)[41]. Additional rules for woodland habitats are provided in section 6.8.

TABLE 6-1: Habitat distinctiveness trading rules in biodiversity metric 3.1

Baseline habitat distinctiveness	Distinctiveness of replacement habitat required by trading rules (N.B. applies to creation and enhancement)
Very high	**Losses are not permitted** within the metric *(Principle 4 and Rule 3)* Bespoke assessment and compensation required
High	Must be replaced with biodiversity units of the **same habitat type** *(Rule 3)*
Medium	Must be replaced with: Medium distinctiveness habitat from **same broad habitat type** OR Any habitat from a **higher distinctiveness band** *(Principle 5)*
Low	Must be replaced with: **Same distinctiveness habitat** OR Any habitat from a **higher distinctiveness band** *(Principle 5)*
Very low	Replacement not required (Are of little/no biodiversity value - zero biodiversity unit score)

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[41] Note: whilst it is important that the Rules and Principles (Chapter 2) are followed, ecological judgement should always be applied in determining the most appropriate replacement habitats, based on the nature of the habitats being lost and the location.

6.8.   In England there is a presumption against the loss of woodland and a need to increase overall woodland cover (Defra, 2021)[42] and (Forestry Commission, 2017)[43]. The metric trading rules support the delivery of this policy through requiring 'like for like' habitat replacement for all high distinctiveness woodland types. There are, however, three situations where biodiversity metric 3.1's rules permit losses of woodland area:

- Loss of the woodland habitat type 'other coniferous woodland' – this a 'low' distinctiveness habitat for which the trading rules state only that the same distinctiveness or higher distinctiveness habitat (i.e. not specifically woodland) are required. In this instance replacement of any losses with the same distinctiveness or higher distinctiveness woodland habitat should be considered, where appropriate, to avoid an overall loss of woodland cover.

- Loss of 'other woodland; broadleaved', 'other woodland; mixed' or 'Scots pine woodland' – these are 'medium' distinctiveness habitats for which the trading rules require replacement with habitat from the same broad habitat type ('woodland and forest') or any higher distinctiveness habitat. Again, replacement of any losses with the same distinctiveness or higher distinctiveness woodland habitat is preferred to avoid an overall loss of woodland cover.

- If loss of woodland habitats, as described in the two bullet points above occurs, and if replacement of losses in woodland habitat are delivered solely through enhancement of existing woodland there will be a reduction in the area cover of woodland habitat. Woodland creation should be considered, alongside enhancement, to avoid an overall loss of woodland cover.

Condition

6.9.   The condition categories used for area habitats are given in Table 6-2, while the detail of how condition should be assessed for each habitat type is explained in Part 1 of the Technical Supplement.

6.10.   The condition of a habitat is directly linked to the area habitat biodiversity unit (AHBU) score; better condition habitats will have a higher biodiversity unit value at baseline. For post-intervention calculations the proposed habitat condition will also influence the AHBU score, however, better condition habitats may not always achieve the highest AHBU outcomes. This is because, in some cases, it will take a significant time to reach good condition, which brings additional risk factors (time to target condition and difficulty).

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[42] DEFRA (2021) *The England Trees Action Plan 2021-2024* [online]. Defra, London. Available from: England Trees Action Plan 2021 to 2024 - GOV.UK (www.gov.uk)

[43] FORESTRY COMMISSION (2017) *The UK Forestry Standard - The government's approach to sustainable forestry,* 4th ed [online]. Forestry Commission, Edinburgh. Available from: UK Forestry Standard

6.11. For example, the time to reach good condition within metric 3.1 ranges from 3 years for a bioswale to 30+ years for a range of woodland, wetland and heathland habitats.

TABLE 6-2: Condition categories used for area habitats.

Condition categories	
Category	**Multiplier**
Good	3
Fairly good	2.5
Moderate	2
Fairly poor	1.5
Poor	1
N/A – agriculture	1
N/A – other	0

Calculating area habitat biodiversity units (AHBUs)

6.12. Box 6-1 shows the formulae used to calculate biodiversity unit values for area habitats (see Box 2-1 for schematic illustration). A calculation tool is available to download which automates these metric calculations.

Box 6-1: Calculating area habitat biodiversity units (AHBUs)

Equation 1: Pre-impact (t_0) biodiversity value for <u>baseline</u>

$$t_0 \; Baseline \; AHBU = \left(A^{t0} \times Q_D^{t0} \times Q_C^{t0} \right) \times \left(Q_{SS}^{t0} \right)$$

Equation 2: Post-impact (t_1) biodiversity value for <u>habitat creation</u>

$$t_1 \; Creation \; AHBU = \left\{ \left[A^{t1} \times Q_D^{t1} \times Q_C^{t1} \right] \times \left[R_D \times R_T \right] \times \left[Q_{SS}^{t1} \right] \right\} \times R_{OS}$$

Equation 3: Post-impact (t_1) biodiversity value for habitat <u>restoration and enhancement</u>

$$t_1 \; Enhancement \; AHBU$$
$$= \left[\left(\left[\left\{ A^{t1} \times Q_D^{t1} \times Q_C^{t1} \right\} - \left\{ A^{t0} \times Q_D^{t0} \times Q_C^{t0} \right\} \right] \times \left\{ R_D \times R_T \right\} \right) \right.$$
$$\left. + \left\{ A^{t0} \times Q_D^{t0} \times Q_C^{t0} \right\} \right] \times \left\{ Q_{ss}^{t1} \right\} \times R_{OS}$$

A	Area of habitat (hectares)	R_D	Difficulty (a risk factor)
Q_C	Condition (a quality measure)	R_T	Time to target condition (a risk factor)
Q_D	Distinctiveness (a quality measure)	R_{OS}	Spatial risk (off-site risk factor)
Q_{SS}	Strategic significance (a quality measure)	t0	Pre-intervention (baseline)
		t1	Post-intervention

Applying multipliers to different interventions

6.13. To properly reflect the different risks which apply to habitat creation versus habitat enhancement/restoration, it is necessary for area habitat biodiversity unit calculations to distinguish between these two (see 5.55). The difference between the calculations and application of the risk multipliers is shown in Table 6-3.

6.14. A baseline (t_0) and post-intervention (t_1) calculation is needed for each habitat parcel within a scheme. Even though the full range of risk multipliers are applied in both post intervention (t_1) scenarios the detail of the calculations for creation and enhancement are different; for habitat creation they are applied to the whole value of the habitat whereas for enhancement/restoration they apply only to the improvement in the habitat. No risk multipliers are applied to retained habitats, but these residual area habitat biodiversity units are accounted for in the calculation (Fig. 5-1).

TABLE 6-3: Which scores and multipliers apply in calculations

	Area	Distinctiveness	Condition	Strategic significance	Difficulty to create	Difficulty to enhance	Time to target condition	Spatial risk
t$_0$ **Baseline units**	Yes	Yes	Yes	Yes	No	No	No	No
t$_1$ **Creation units**	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes*
t$_1$ **Enhancement units**	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes*

*Only when the creation or enhancement is being delivered at an **off-site** location, i.e. away from the site where the impact is occurring.

6.15.　Parts 2 and 3 of the Technical Supplement include details of quality attributes and risk multipliers applied for each area habitat type.

Woodland creation and biodiversity metric 3.1

6.16.　 Within the biodiversity metric 3.1 the time taken for a newly created woodland to reach 'good' condition is 30+ years for all woodland habitat types, as 'Woodland and forest' habitats take a long time to develop structural complexity. Woodland types of high distinctiveness are also difficult to establish (and are attributed a 'high' difficulty for creation). These risks can result in low biodiversity unit scores being generated when selecting high distinctiveness woodlands for creation.

6.17.　The majority of newly created woodland associated with projects and developments would be classified as 'other woodland; broadleaved' or 'other woodland; mixed'. These have a lower risk of delivery (and are attributed 'low' difficulty for creation).

6.18.　If a high distinctiveness woodland type is being lost a 'like for like' replacement must be provided, (i.e. the 'other' woodland types are not an option). In these situations, you should aim to replicate the species composition and structure of the particular woodland type that is being lost, but target a realistic condition that can be achieved within in the timeframe of the net gain delivery. This may be limited to poor condition, as a newly planted high distinctiveness woodland would be unlikely to exceed this within 30 years).

Note: for enhancement/restoration of woodland habitats where achieving good condition is more realistic the risk multipliers are correspondingly lower (see Figure 5-1).

Recording habitat mosaics in biodiversity metric 3.1

6.19. Where it is not possible to map parcels of distinct habitat types within an area because they form a mosaic without clear boundaries, or where the habitat mix is at a scale too fine to map, you should estimate the proportion of each component habitat that makes up the mosaic. These can then be entered into the metric as separate habitats. You will still need to assess the condition of the component habitats, which may differ across the site (see Box 6-2).

6.20. Complex mosaics of habitats provide numerous niches and ecotones for biodiversity. Whilst the metric considers habitats individually, consideration should be given to their structure when designing new habitat management and when considering the value and species potential of existing habitats. Therefore, when assessing habitat condition on sites with complex mosaics, consideration should be given to utilising one of the intermediate condition scores within the metric. Where such judgement has been exercised this should be recorded in the notes section of the metric and agreed with the relevant decision maker.

Box 6-2: Recording habitat mosaics in biodiversity metric 3.1

Habitat mosaics

A site contains 1ha of land which is a mosaic of calcareous grassland and mixed scrub of which approximately 75% is calcareous grassland and 25% is mixed scrub.

In the metric baseline you would record 0.75ha of calcareous grassland and 0.25ha of mixed scrub.

Accounting for condition: If the habitat condition varies this will need to be recorded in separate rows in the metric. For example, if the calcareous grassland is mainly of moderate condition but has several patches with a total area of 0.1ha, which are in good condition, record this as separate lines in the metric as follows: 0.1ha calcareous grassland good condition and 0.65ha in moderate condition.

6.21. Suburban housing is a mosaic of developed land and vegetated gardens habitats. When entering post-intervention predictions for areas where there will be a small-scale mosaic of developed and natural surfaces, such as housing and gardens in suburban areas, the assessor should use a ratio for developed land of 70:30 for sealed surface to vegetated garden (see Box 6-3) unless detailed landscaping information is available. For particularly high- or low-density developments this ratio may be altered accordingly. However, this must be evidenced and justified in the 'Assessor comments', and any deviation from the 70:30 ratio should be agreed with the determining body.

Box 6-3: Suburban mosaic

A 10ha development will create a mixture of roads, public greenspace and housing. The roads (developed land; sealed surface) will occupy 1ha, the public greenspace (modified grassland with Urban trees) will occupy a further 2ha and the remaining 7ha will be private houses and gardens.

In the metric you would record the 7ha of housing and gardens, by applying the 70:30 ratio, as 4.9ha of 'developed land; sealed surface' and 2.1ha of 'vegetated garden'. The remaining habitats (1ha developed land; sealed surface and 2ha modified grassland with Urban trees) would be recorded in the normal way.

7: Urban trees

7.1.   In biodiversity metric 3.1 the term 'Urban tree' applies to all trees in urban situations. Urban trees may be situated within public land, private land, institutional land and land used for transport functions.

7.2.   Trees in urban areas can, under the right conditions, support rich biodiversity (including lichens, bryophytes, invertebrates and birds). They can provide connectivity between established reservoirs of urban biodiversity and contribute towards maintaining viable urban populations within these sites.

7.3.   Native species provide the greatest benefit for biodiversity and are the preferred option. However, tree planting in urban areas has long included non-native species. These species can still contribute positively, particularly in relation to providing a seasonal food source for nectar feeders (and other invertebrates), as well as supporting vertebrates that feed on species that are hosted by non-native trees.

7.4.   The biodiversity metric 3.1 considers Urban trees to include individual street trees, linear blocks and perimeter blocks of trees <u>within the urban setting</u>. Their definitions are explained in Table 7-1 and photographic examples are provided in Box 7-1.

TABLE 7-1: Urban tree definitions

Urban tree categories	
Individual trees	Young trees over 75mm in diameter measured at 1.5m from ground level and individual semi-mature and mature trees of significant stature and size that dominate their surroundings, whose canopies are not touching but that are near other Urban trees.
Perimeter blocks	Groups or stands of trees within and around boundaries of land, former field boundary trees incorporated into developments, individual trees whose canopies overlap continuously.
Linear blocks	Lines of trees along urban streets, highways, railways and canals whose canopies overlap continuously.
Note: it is important these categories are applied in an urban environment only. For example, a line of trees along a canal or road would not mean automatic classification as a linear block of Urban trees, as these features may also fit the definition of a 'line of trees' within the linear module of the metric. The surveyor should take into account the degree of 'urbanisation' of habitats around the tree and assign the best fit for the particular situation.	

BOX 7-1: Urban trees

Examples of individual Urban trees

Examples of linear blocks of Urban trees

Examples of perimeter blocks of Urban trees

Accounting for Urban trees in biodiversity metric 3.1

7.5.　Given the value of Urban trees, any loss, creation or enhancement of Urban trees needs to be factored into biodiversity metric 3.1. Urban trees are included within area-based habitats. The metric area measurement for a tree can be calculated using the Root Protection Area as explained below.

Distinctiveness and difficulty of creation and enhancement

7.6.　Trees are not usually considered in isolation but as a component of a more complex habitat (such as woodland). Trees in urban areas are commonly non-native species and often sit in stressed environments. Because of these constraints, Urban trees are set a 'Medium' distinctiveness score within biodiversity metric 3.1.

7.7.　Urban trees are attributed a low difficulty for both creation and enhancement.

Trading Rules

7.8.　The mitigation hierarchy and trading rules apply to Urban trees. Given Urban trees are a 'Medium' distinctiveness habitat trading rules stipulate that the same broad habitat type (or a higher distinctiveness habitat) is required. However, given the important ecosystem services value provided by trees, where possible 'like for like' compensation is the preferred approach (i.e. where possible any loss of Urban trees should be replaced by Urban trees - rather than other urban habitats).

Calculating area

Baseline

7.9.　The area calculation for Urban trees is worked out using the Root Protection Area (RPA) (British Standards Institution, 2012)[44] formula **area = π × r^2** where **r** is twelve times the tree's Diameter at Breast Height (DBH) for a single stemmed tree. For multi-stemmed trees the DBH of the largest stem in the cluster should be used to determine radius (**r**).

- Where detailed measurements are available to the assessor, through an Arboricultural Impact Assessment (AIA) or similar, these measurements should be used to determine the area measurement for use with the biodiversity metric.

- The area of all trees within the project boundary should be accounted for, regardless whether a tree would require root protective measures or not.

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[44] For more information see: THE BRITISH STANDARDS INSTITUTION (BSI) (2012) *Trees in relation to design, demolition and construction – recommendations* [online]. Available from: British Standard 5837 2012 Trees in relation to design, demolition and construction

Therefore, DBH values within AIA reports should be used to calculate area values for use with the metric (rather than RPA's prescribed by the AIA).

7.10. In the absence of detailed measurements, the 'Urban tree helper' may be used to generate an area equivalent RPA value (for example, at project scoping prior to detailed survey). The urban tree helper is found within the 'Main menu' of the metric tool. Table 7-2 sets out class sizes of Urban tree sizes, and area equivalent (for input into the metric tool).

TABLE 7-2: Urban tree size classes and their area equivalent

Size class	Diameter at breast height (cm)	Metric RPA radius (m)	Metric area equivalent (ha)
Small	≤ 30cm	3.6m	0.0041 ha
Medium	> 30 to ≤ 90cm	10.8m	0.0366 ha
Large	> 90cm	15.6m	0.0764 ha

Post-development

7.11. When calculating the area for newly planted Urban trees Table 7-2 should be used. Size classes for newly planted trees should be classified by projected size at 30 years from planting.

7.12. When determining post-development changes to rural hedgerows and lines of trees recorded in the baseline (see Chapter 8) these should not be entered post-development as linear blocks of Urban trees. This is to satisfy trading rules.

Strategic significance

7.13. The approach taken to determine strategic significance is described in Sections 5.15 - 5.23.

Note: where there are mitigating factors, *then the relevant decision maker (e.g. a local planning authority tree officer) may deem that tree to be of particular strategic significance.*

Condition assessment

7.14. Urban trees are assessed using an Urban tree condition assessment proforma to score the trees as either poor, moderate or good condition (see Technical Supplement Part 1a).

7.15. For the condition assessment, the proforma allows for trees within linear blocks and perimeter blocks to undergo a grouped assessment – rather than complete a proforma for each individual tree. However, the RPA of each individual tree within

that block should account towards metric area measurements (as detailed in sections 7.9 – 7.10).

Data input

7.16. Urban trees are treated in the same way as an area habitat within the metric. For pre- and post-intervention calculations the assessor should follow the area habitat calculation approach described in Chapter 6.

7.17. The area of Urban trees should not be deducted from the total area of other habitats within the site boundary. The biodiversity metric does not count Urban tree RPA areas towards total site area and the area of habitat underneath Urban tree should be recorded as the relevant habitat type and captured within the biodiversity metric tool.

7.18. Trees of separate conditions should be entered separately within the metric. Trees of separate size in the same condition may be grouped together for data input.

7.19. If required, the area measurements for trees of the same size class and condition may be grouped together within the 'Urban tree helper' and entered as separate rows in the biodiversity metric. The 'Urban tree helper' is shown in Box 7-2 below, and the tool is available on the 'Main menu' of the metric tool.

BOX 7-2 The Urban Tree helper

Urban tree helper						
Tree size	**Number of trees and area (ha) for each condition state**					
	Poor	Area	Moderate	Area	Good	Area
Small		0.0000		0.0000		0.0000
Medium		0.0000		0.0000		0.0000
Large		0.0000		0.0000		0.0000
Total	0	0.0000	0	0.0000	0	0.0000

Rural trees

7.20. The methodology described above for calculating area equivalent and condition may also be used for <u>individual trees</u> outside of the urban environment.

7.21. Linear or perimeter blocks within the rural environment are better represented by the 'linear' or 'woodland' habitat types and should be assessed as such.

8: Linear habitats – Hedgerows and lines of trees

8.1.　Biodiversity metric 3.1 includes separate calculations for linear habitats:

- Hedgerows and lines of trees; and
- Rivers and streams.

8.2.　Treating these linear habitats like other habitats and accounting for their biodiversity value using the area habitat approach would undervalue their importance and would fail to ensure adequate provision for losses. It is therefore necessary to take separate account of these habitat types so that their contribution to biodiversity is properly acknowledged (see 2.7, 2.8 and Rule 4).

8.3.　'Hedgerow and lines of trees biodiversity units' (HBUs) are the units used to measure the biodiversity value of hedgerows and lines of trees and to clearly differentiate from biodiversity units associated with area habitats and river and streams habitats (RBUs).

Hedgerows and lines of trees

8.4.　Hedgerows as a linear habitat are a feature almost unique to the British Isles. Biodiversity metric 3.1 further refines the approach taken for hedgerows in the Defra biodiversity metric (2012), and biodiversity metric 2.0 (2019), which both separated hedgerows from area habitats. Lines of trees are included since they display some of the same functional qualities as hedgerows.

8.5.　Urban trees are considered separately to lines of trees in the wider environment, since they generally occur in an urban environment surrounded by developed land. For information on how Urban trees are considered in biodiversity metric 3.1 see Chapter 7.

Calculating hedgerows and lines of trees biodiversity units (HBUs)

8.6.　Box 8-1 shows the formulae used to calculate biodiversity unit values for hedgerows and lines of trees.

8.7.　To properly reflect the different risks, it is necessary for hedgerow and line of trees biodiversity unit calculations to distinguish between creation and enhancement (see 5.55). A baseline (t_0) and post-intervention (t_1) calculation is needed for each hedgerow or line of trees within a scheme to determine the uplift in biodiversity value.

Box 8-1: Calculating hedgerows and lines of trees biodiversity units (HBUs)

Equation 1: Existing (pre-intervention) (T_0) biodiversity value

$$T_0 \; Baseline \; HBU = \left(L^{t0} \times Q_D^{t0} \times Q_C^{t0}\right) \times \left(Q_{SS}^{t0}\right)$$

Equation 2: Post-intervention (T_1) biodiversity value for <u>hedgerow creation</u>

$$T_1 \; Creation \; HBU = \left[L^{t1} \times Q_D^{t1} \times Q_C^{t1}\right] \times \left[R_D^{t1} \times R_T^{t1}\right] \times Q_{SS}^{t1} \times R_{OS}$$

Equation 3: Post-intervention (T_1) biodiversity value for <u>hedgerow restoration and enhancement</u>

$$
\begin{aligned}
T_1 \; Total \; HBU \; &after \; Enhancement \\
&= \{[(\left[\{L^{t1} \times Q_D^{t1} \times Q_C^{t1}\} - \{L^{t0} \times Q_D^{t0} \times Q_C^{t0}\}\right] \times \{R_D \times R_T\}) \\
&+ \{L^{t0} \times Q_D^{t0} \times Q_C^{t0}\}] \times Q_{ss}^{t1}\} \times R_{OS}
\end{aligned}
$$

L	Length of hedgerow (kilometres)	R_T	Time to target condition (a risk factor)
Q_C	Condition (a quality measure)	t0	Before intervention
Q_D	Distinctiveness (a quality measure)	t1	Post intervention
Q_{SS}	Strategic significance (a quality measure)	R_{OS}	Off-site (spatial) risk
R_D	Difficulty (a risk factor)		

Assessing the quality of hedgerows and lines of trees

Type and length

8.8.   Type and length (in kilometres) of existing hedgerows must be recorded during a site survey.

8.9.   The key and descriptions provided in the Defra (2007) 'Hedgerow Survey Handbook'[45] should be used to determine if a feature should be considered a hedgerow, hedgerow with trees, a line of trees or not a hedgerow at all.

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[45] DEFRA (2007) *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK.* 2nd ed [online]. Defra, London. PB1195. Available from: <u>Hedgerow Survey Handbook (publishing.service.gov.uk)</u>

8.10. The specific type of hedgerow can then be identified using the flow chart in Box 8-2, Detailed descriptions are given in Table TS1-2 in the biodiversity metric 3.1 Technical Supplement.

Box 8-2: Key to determine hedgerow and line of trees habitat type
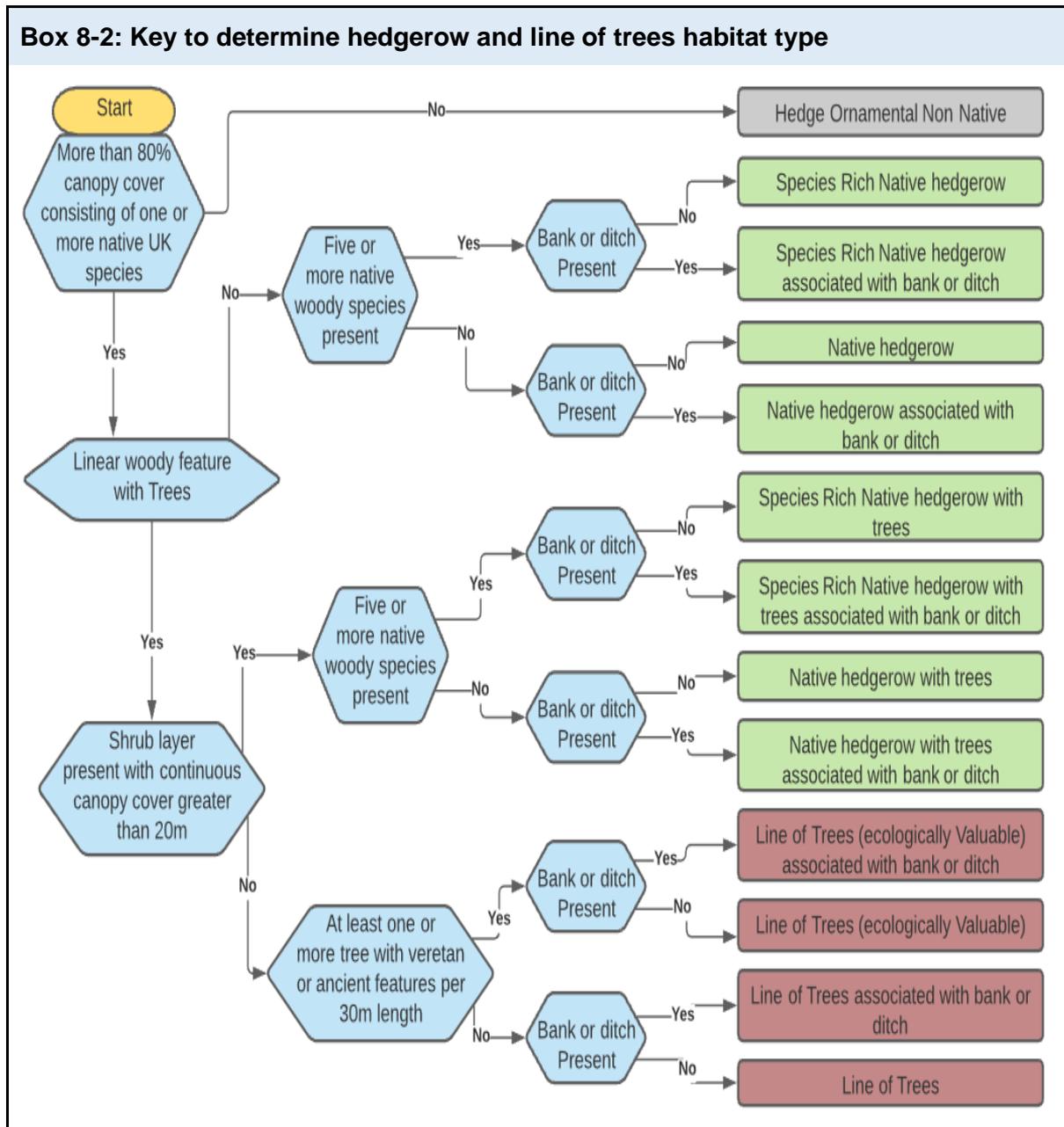
Distinctiveness

8.11. Hedgerows are assigned a distinctiveness rating determined by the range of ecological niches likely to be present for each hedgerow type. The distinctiveness scores assigned to different hedgerow types are set out in Table 8-1.

8.12. There is no attempt to evaluate the biodiversity unit value of the ground flora associated with hedgerows, despite its potential relevance. This is because the

limited survey window and the level of botanical expertise required are incompatible with the aim of a simple and practical metric (Principle 3).

TABLE 8-1: Distinctiveness categories and scores

Category	Multiplier	Definition
Very high	8	• Native species rich hedgerow with trees - with bank or ditch.
High	6	• Native species rich hedgerow with trees; • Native species rich hedgerow - with bank or ditch; or • Native hedgerow with trees - with bank or ditch.
Medium	4	• Native species rich hedgerow; • Native hedgerow - associated with bank or ditch; • Native hedgerow with trees; • Line of trees (ecologically valuable); or • Line of trees (ecologically valuable) - with bank or ditch.
Low	2	• Native hedgerow; • Line of trees; or • Line of trees - with bank or ditch.
Very low	1	• Any hedgerow containing 20% or more canopy cover of a non-native species[46].

Trading Rules

8.13.   Linear habitats are subject to the same trading rules as area habitats, as detailed in Table 6-1.

8.14.   Lost double hedgerows should be compensated with a double hedgerow, typically a path or track width apart.

Condition

8.15.   All hedgerows and lines of trees recorded on site must be assigned a habitat condition score. Habitat condition can only be assessed after habitat type has been determined (see Box 8-2).

8.16.   To assess condition, the dimensions and other physical characteristics of a hedgerow or line of trees are assessed against a set of minimum requirements for the habitat to be considered in a good, moderate or poor condition with respect to its ability to support a diverse range of species. Hedgerows and lines of trees are assessed using

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[46] See: UKHAB LTD. (2022) *UK Habitat Classification* [online]. Available from: http://ukhab.org

separate criteria. The full methodology for assessing the condition of hedgerows and lines of trees is described within Part 1b of the Technical Supplement.

Condition assessment of hedgerows and lines of trees

8.17.   A series of attributes, representing key physical characteristics, are used for the hedgerow condition assessment. The attributes, and the minimum criteria for achieving a good condition in each, are set out in the condition sheets in Part 1b of the Technical Supplement. They use similar condition criteria to the 'Hedgerow Survey Handbook' with additional detail taken from other sources.

8.18.   The assessment for lines of trees is based on species composition, canopy continuity and the health and biodiversity value of individual trees.

Strategic significance

8.19.   Strategic significance needs to be evaluated when calculating the biodiversity unit value for both existing and newly created or enhanced hedgerows and lines of trees. The approach taken to determine strategic significance is described in Sections 5.15 - 5.23.

Dealing with risk

Applying risks to different interventions

8.20.   Where new hedgerows are being created, or existing hedgerows restored/enhanced, difficulty, time to target condition and spatial risk multipliers are applied to account for the associated delivery risks.

Difficulty of creation and enhancement/restoration

8.21.   The technical difficulty of creating and restoring hedgerows and lines of trees is given a default value of 'Low' (x 1 multiplier)[47]. Application of this risk multiplier does not, therefore, change the number of biodiversity units generated by a proposed intervention to compensate for losses.

8.22.   While the 'Low' difficulty rating assigned to the creation and enhancement of hedgerows and lines of trees will be appropriate for most replacement schemes, there may be instances where a higher difficulty rating will better reflect the actual difficulty of recreating a particular type of hedgerow[48]. For example, to replace a

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[47] This is unchanged from Defra Biodiversity Metric (2012).

[48] The range of 'difficulty' categories available (and the relevant multipliers) are: very high (x0.1); high (x0.33), medium (x0.67) and low (x1).

particularly species-rich hedgerow, or to replace a local hedgerow type with features that are more difficult to recreate, such as the hedges associated with tall, steeped-sided, stone-faced banks commonly found in Devon and Cornwall, or where there are management challenges such as a high deer population. Expert ecological advice should be obtained where such an exception may apply.

Temporal risk – time to target condition

8.23. As described in Section 5.32 'Time to target condition' is the estimated average time it takes a habitat, in this case hedgerows and lines of trees, to achieve a pre-agreed target quality. Creation/enhancement options for hedgerows and lines of trees which include the addition of trees often have substantially longer times to target condition than those without the addition of new trees. This is necessary to allow for the trees to mature.

8.24. The temporal multipliers based on a 3.5% discounting rate set out in Table 5-6 are also applicable to the hedgerow component of the metric. The times to target condition for creating and enhancing through improving condition for different hedgerow types are given in Table TS3-6 of the biodiversity metric 3.1 Technical Supplement.

8.25. The times to target condition for enhancement through increasing the distinctiveness of a hedgerow or line of trees is determined by consideration of the combination of the changes in distinctiveness and condition between the baseline habitat and the proposed, post-intervention habitat. The time to target condition matrix for enhancement through increasing distinctiveness can be found in the Technical Supplement Part 3.

Habitat banking and delays in creation/enhancement of habitats

8.26. Biodiversity metric 3.1 enables the recording of habitat creation/enhancement in advance or delayed for all habitats including hedgerows and lines of trees. These either reduce or increase the time to target condition proportionately. (Section 5.38)

9: Linear Habitats - Rivers and streams

9.1.   Rivers, streams and their associated floodplains are natural ecological networks used by multiple species. They are physically diverse and biologically rich, defined by their climate, geology and land cover. They are linear features with a high degree of landscape connectivity, as hydrological, geomorphological and biological processes create connectivity between channel, floodplain and terrestrial habitats. The channel, riparian zone (the land alongside the top of the riverbank) and the floodplain are all inter-connected in a naturally functioning river system. There are large varieties of river types in Britain, from active upland boulder-bed rivers to slower-flowing lowland systems, including internationally rare chalk rivers.

9.2.   Most British rivers have been significantly affected by human intervention, in the form of land drainage, flood defence structures, development and direct habitat loss. This has, in some cases, fragmented the river corridor and changed the structure and function of the river channel, riparian zone and floodplain.

9.3.   For the purpose of biodiversity metric 3.1, 'rivers and streams' include those classified as 'main river' and 'ordinary watercourse'[49]. These are watercourses through which water flows (i.e. with a hydraulic function), which includes canals, canalised rivers and rivers with an ephemeral (temporary) nature, such as winterbournes and headwaters. Coastal, tidal and inter-tidal reaches are not included within the rivers and streams component of the biodiversity metric. The habitats contained within intertidal reaches (above mean low water) are included in the area habitats, subtidal habitats are not included in biodiversity metric 3.1.

9.4.   For the rivers and streams component of biodiversity metric 3.1 'ditches' are defined as artificially created linear water-conveyancing features that are less than 5m wide and likely to retain water for more than 4 months of the year. Their hydraulic function is primarily for land drainage, and although partially or fully connected to a river system, they would not have been present without human intervention.

9.5.   Ditches are included as a linear feature within rivers and streams but have a separate condition assessment, see Part 1 of the Technical Supplement for more information.

Note: some heavily engineered ditches may be part of the river system (usually part of the headwater system). If there is uncertainty, consult historic maps, LIDAR data and riverine specialists.

Calculating rivers and streams biodiversity units (RBUs)

9.6.   River biodiversity units (RBUs) are the unit of measurement for rivers and streams. This is to differentiate the river values from the biodiversity units representing area habitats and other linear habitats.

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[49] 'Main rivers' are regulated by the Environment Agency, 'ordinary watercourses' are regulated by Lead Local Flood Authorities - these may be district councils, unitary authorities, and internal drainage boards.

9.7. The equations used to calculate river biodiversity unit values are given in Box 9-1.

9.8. It may be appropriate to exclude the area occupied by rivers and streams habitats greater than 5 metres wide from area habitat calculations. This is described in Chapter 3, Step 6 h.

Box 9-1: Calculating river biodiversity units (RBUs)

Equation 1: Existing (pre-intervention) (T₀) biodiversity value

$$T_0 \; Baseline \; RBU = \left(L^{t0} \times Q_D^{t0} \times Q_C^{t0} \times Q_{SS}^{t0}\right) \times R_{RE}^{t0} \times R_{WE}^{t0}$$

Equation 2: Post-intervention (T₁) biodiversity value for river or stream <u>creation</u>

$$T_1 \; Creation \; RBU = [L^{t1} \times Q_D^{t1} \times Q_C^{t1} \times Q_{SS}^{t1}] \times [R_D^{t1} \times R_T^{t1}] \times [R_{OS \times} \times R_{RE}^{t1} \times R_{WE}^{t1}]$$

Equation 3: Post-intervention (T₁) biodiversity value for river or stream <u>enhancement</u>

$$T_1 \; Total \; RBU \; after \; Enhancement$$
$$= \{[([\{L^{t1} \times Q_D^{t1} \times Q_C^{t1}\} - \{L^{t0} \times Q_D^{t0} \times Q_C^{t0}\}] \times \{R_D \times R_T\}) + \{L^{t0} \times Q_D^{t0} \times Q_C^{t0}\}]$$
$$\times Q_{SS}^{t1}\} \times [R_{OS} \times R_{RE}^{t1} \times R_{WE}^{t1}]$$

L	Length of river or stream (kilometres)	R_T	Time to target condition (a risk factor)
Q_C	Condition (a quality measure)	t0	Before intervention
Q_D	Distinctiveness (a quality measure)	t1	Post intervention
Q_SS	Strategic significance (a quality measure)	R_OS	Spatial (offsite) risk
R_D	Difficulty of creation or enhancement (a risk factor)	R_RE	Riparian encroachment unit modifier
		R_WE	Watercourse encroachment unit modifier

Assessing the quality of rivers and streams

Distinctiveness

9.9.   The distinctiveness categories for rivers and streams are based on the Priority Habitats classification, as defined under Section 41 of the Natural Environmental and Rural Communities Act, 2006.

9.10.   Priority River Habitats include a number of river types[50]:

- Riverine water bodies of high hydro-morphological/ecological status;
- Chalk rivers;
- Watercourses with water crowfoot assemblages (Habitats Directive Annex I habitat H3260);
- Active shingle rivers; and
- Headwater streams.

9.11.   The distinctiveness assessment can mostly be undertaken as a desk-based exercise, using existing information and data sets. Distinctiveness classes and their descriptions are detailed in Table 9-1. As culverts cannot be identified from online sources alone these require site surveys to identify. The recommended stages to follow when assessing distinctiveness are outlined in Figure 9-1 below.

1. Assess Priority Habitat classification using available data sets	→	2. Assess river classification: main river, ordinary watercourse, ditch or canal using available data sets	→	3. On-site query - is the river within a culvert?
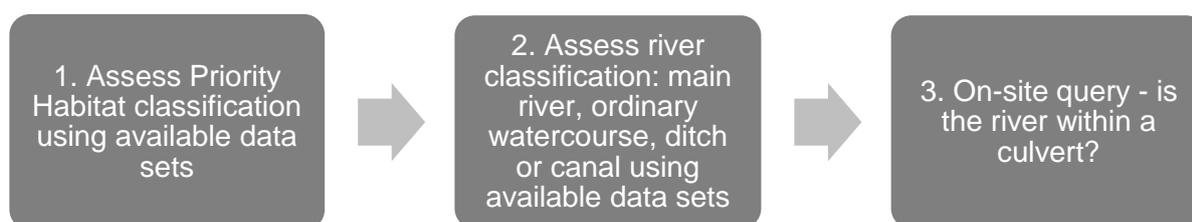
FIGURE 9-1 Recommended stages to follow when assessing distinctiveness[51]

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[50] See: JNCC (2011) *UK BAP Priority Habitat description. Rivers* [online]. JNCC, Peterborough. Available from: Rivers (UK BAP Priority Habitat description) (jncc.gov.uk)

[51] Links to guidance on each stage:

Stage 1: NATURAL ENGLAND (2021) *Priority River Habitat – Rivers* [online]. Available from: Priority River Habitat - Rivers - data.gov.uk

Stage 2: Main River – ENVIRONMENT AGENCY (2020) *Statutory Main River Map* [online]. Available from: ArcGIS Web Application;
Ordinary watercourses - Local authority data sets available on request from local authority:

TABLE: 9-1 Distinctiveness categories for rivers and streams

Distinctiveness	Metric description	Weighting	Notes
Very high	Shown on the Priority Habitat rivers map	8	Rivers – Priority Habitat rivers and streams of high hydro-morphological and ecological status
High	Rivers and streams (Other)	6	All other rivers streams that are not classified as Priority River Habitat
Medium	Canals Ditch	4	Canal Ditch (see 8.28 for definition of a ditch)
Low	Culvert	2	A covered channel or pipe designed to prevent the obstruction of a watercourse or drainage path by an artificial construction[52]

Condition

Survey effort

9.12. The rivers and streams condition assessment describes on-site physical habitat diversity. The condition assessment is not completed by using standard condition score sheets (with the exception of ditches, which have separate condition criteria as detailed in the Technical Supplement). Instead, a detailed rivers and streams condition assessment is required. Further detail is provided in Technical Supplement Part 1c.

> ***Note: the rivers and streams condition assessment requires users to be trained and accredited[53].***

9.13. The field component of the rivers and stream condition assessment includes sampling cross sections of the watercourse using the MoRPh methodology. The number of

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GOV.UK (No date) *Find your local council* [online]. Available from: https://www.gov.uk/find-local-council.
Internal Drainage boards: DEFRA (2019) *Defra Spatial Data Download* [online]. Available from: Defra Spatial Data Download

[52] FLOOD AND WATER MANAGEMENT ACT 2010. (c.29) London: The Stationery Office. [online]. Available from: Flood and Water Management Act 2010 (legislation.gov.uk)

[53] Training details can be found at: MODULAR RIVER SURVEY TEAM. (2022) *River Condition Assessment for Biodiversity Metric 3.0* [online]. Available from: https://modularriversurvey.org/river-condition

MoRph 5 surveys to complete will differ depending on the site and character of the river. The survey should capture a minimum 20% length of the river within the red line boundary; this will enable changes in riverine condition to be captured. Surveyors should survey locations where noticeable changes in river condition occur e.g. areas of high riverine/riparian quality, areas of physical modification, areas where restoration could occur, areas of potential impact.

<u>Forecasting condition</u>

9.14. The river condition assessment information system can be used to support scenario modelling of changes proposed within the surveyed sub-reaches to inform potential mitigation options. To forecast predicted condition scores post-development, re-run the river condition assessment with planned river restoration interventions. Alternatively, view the downloadable excel table of negative and positive weighted riverine features to help understand which features can be changed to achieve net gain.

TABLE 9-2: Condition weightings for rivers and streams

Classification	Weighting
Good	3
Fairly good	2.5
Moderate	2
Fairly poor	1.5
Poor	1

Applying the river condition assessment

<u>Improving/reducing riverine condition</u>

9.15. River condition can be improved in two ways. Either through enhancing (improving) the **condition** of the same type of river (e.g. an 'other rivers and streams' river goes from poor to moderate condition). Alternatively, enhancing the river to a **higher distinctiveness river type** (e.g. a culvert to an 'other rivers and streams' or an 'other rivers and streams' to a 'Priority Habitat' river), in this scenario the condition can be equivalent or better in the enhanced river type.

9.16. In situations where a reduction in condition or distinctiveness occurs (channel straightening, physical modification, altering the channel line), record the change in condition as a loss of the existing river (as recorded in the baseline) and enter the new channel length and condition as creation.

<u>Default condition score</u>

9.17. Only under one circumstance is a **default condition score** applied. A default condition score of 1 (poor) is entered where the river is in a culvert.

<u>On-site boundary</u>

9.18. It is only necessary to apply the river condition assessment within the on-site boundary of the intervention site (on-site and off-site). Where sites are smaller than 5 contiguous MoRPh modules i.e. the full 5 units would extend beyond the on-site boundary. Surveyors will need to visually assess the required MoRPh features up-and-down stream as far as is reasonably practicable.

<u>Variation in river condition</u>

9.19. Where the condition of the river varies across the site, enter each distinct section of river as a separate row within the metric calculation tool. Each distinct section will have a separate condition score. For example, for a site that contains a river, which is part-culvert and part-open enter this as two separate lines:

> 1: Length of the river and condition score (in culvert);
> 2: Length of the river and condition score (open section).

	Habitat description	**Condition score**

BOX 9-2: Case study - improving condition

Tokynton Park, River Brent, River Restoration Project

	Habitat description	**Condition score**	
Before	*Canalised section of river with no/limited in channel habitat diversity, hard revetment and low habitat diversity riparian zone.*	*Poor (1)*	
After	*Re-meandered channel re-instating varied flow types and in channel features, such as riffles and pools. Hard revetment removed and banks re - profiled.*	*Moderate (2)** **the presence of invasive species and some sections of hard revetment prevent this section achieving good (3).*	

Riparian zone encroachment

9.20.   In biodiversity metric 3.1 the riparian zone is defined as a 10m zone from the top of the riverbank. It would naturally be periodically flooded, and directly influences the hydrological, geomorphological and biological functions and processes within the river channel. As the riparian zone is an intrinsic part of the river system it is not considered as a separate habitat within the rivers and streams calculation but as part of the linear feature.

9.21.   Development within the riparian zone is termed 'riparian encroachment'. In biodiversity metric 3.1 riparian encroachment is defined as: *A reduction in the quantity/ quality and 'use' of available habitat that forms a specific ecological function for riparian or aquatic specialist species. Whereby, 'use' is defined as the ability of a species to: commute, forage, rest/ dwell, or access as part of its life cycle between aquatic and terrestrial phases.* In the context of riparian encroachment in the baseline 'development' is the presence of any habitats of very low distinctiveness found within the riparian zone (as listed within the biodiversity metric e.g. hard standing etc.).

9.22. The loss of either quantity or quality of the riparian zone will have a bearing on its ecological use and function. Encroachment is considered as **minor**, **moderate** or **major** (Table 9-3). The bands reflect how far the development has encroached toward the river channel (distance) or how much of the 10m riparian zone (by % area) is covered by the development footprint (see Figure 9-2). The percentage area is measured as a percentage of the total riparian zone area within the development boundary.

9.23. In biodiversity metric 3.1, encroachment is considered in both the baseline and post-intervention scenario, allowing positive enhancements to the riparian zone to be reflected in river biodiversity unit scores.

TABLE 9-3: Description of riparian encroachment bands

Riparian encroachment band	Multiplier	Description
No encroachment	1.00	No development within 10m of bank top.
Minor	0.95	Any development 8-10m from bank-top (up to 100% of area); **or** Where development footprint occupies 0-10% of the riparian zone area 4-10m from bank-top.
Moderate	0.85	Any development where footprint occupies between 10-25% of the riparian zone area 4-10m from bank-top.
Major	0.75	Any development 0-4m from bank-top (*see exceptions*); or Where development footprint occupies >25% of the total riparian zone area.
Exceptions		

- Baseline canal/river navigation towpaths and established existing river crossings (footbridges, road bridges, rail crossings etc.) do not constitute encroachment. These should be recorded as 'No encroachment'. The impact of these features may be captured through the MoRPh survey.

- **Major encroachment only** – a maximum total of 5% footprint for amenity features (e.g. benches and associated paths) and small utility units (e.g. pump houses and associated paths) would not constitute encroachment.

9.24. The riparian zone can be enhanced through reducing the extent of encroachment. For example, by removing hard-standing or other structures, reconnecting channel–riparian interactions. Beneficial measures such as providing appropriate planting that

improves riparian habitat complexity, installing green roofs/walls, and/or the inclusion of wetland features such as backwaters and ponds can also be incorporated into the riparian zone.

Note: enhancements to the riparian zone also contribute to area biodiversity units.

9.25. If you need to offset losses which are caused by encroachment into the riparian zone, then you are not restricted to delivering riparian betterment. Gains can also be achieved through improvements to the condition of the river or reducing in-channel encroachment. For example, removing toe boarding or installing in-channel woody debris.

9.26. The riparian zone is an intrinsic part of the river system and is assessed within the river condition assessment. To avoid double counting, river biodiversity units have been designed to work alongside area biodiversity units in the riparian zone. The area that the riparian zone occupies, and the habitats therein, should also be recorded in the 'Area habitats' tab of the metric calculator tool. For example, a stand of wet woodland in the riparian zone that inputs large amounts of woody material into the channel would be an important aspect of how the river functions and the in-channel habitat features it generates but its area biodiversity unit value is also recorded in the 'Area habitats' tab of the calculation tool.

(a) Minor encroachment — Any development 8-10m from bank top (up to 100% of the 8-10m riparian zone area). OR Development footprint occupies 0-10% of the riparian zone area 4-10m from bank top.
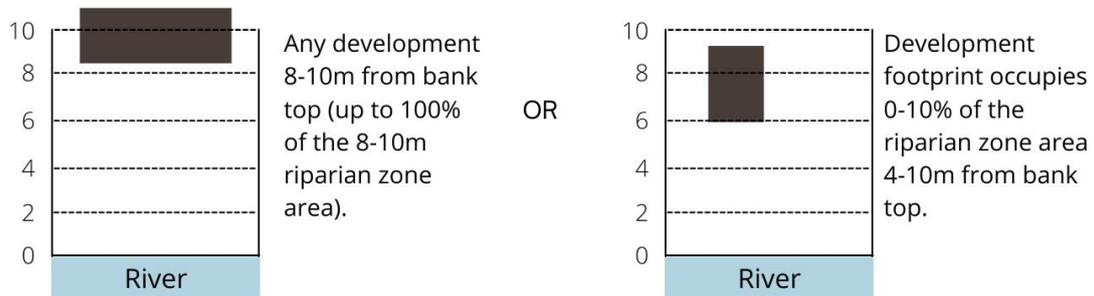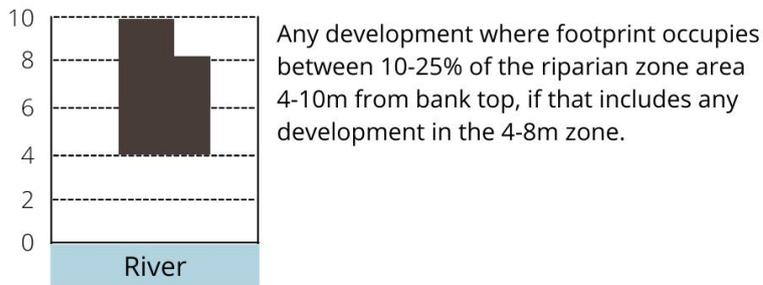
(b) Moderate encroachment — Any development where footprint occupies between 10-25% of the riparian zone area 4-10m from bank top, if that includes any development in the 4-8m zone.

(c) Major encroachment — Any development 0-4m from bank top (see Table 9-3 for exceptions). OR The development footprint occupies >25% of the total riparian zone area.
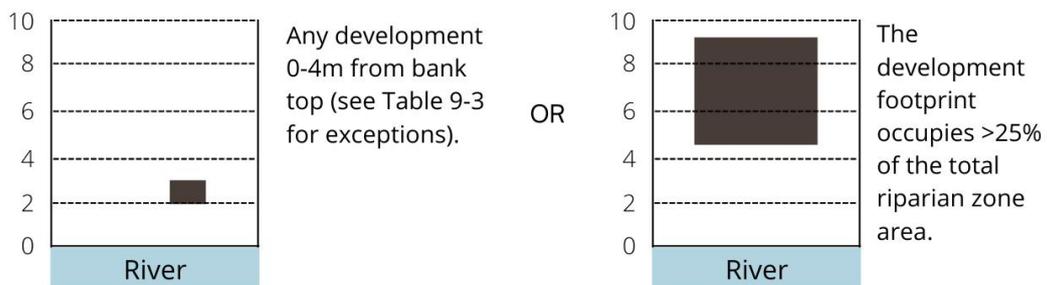
FIGURE 9-2: Riparian encroachment bands

In-watercourse encroachment

9.27. The in-watercourse multiplier accounts for development that occurs within the banks or the river channel. The multiplier accounts for the impact of individual human interventions that affect the function of the river corridor.

In biodiversity metric 3.1 in-watercourse encroachment is defined as:

An intervention that adversely affects hydrological and geo-morphological processes, creating localised changes in flow (e.g. eddying, erosion) and/or sediment dynamics and riverine connectivity - longitudinal, lateral or vertical. The result is localised changes in habitat, species and the use of migratory pathways.

9.28. In-channel encroachment is considered **minor** or **major** (Table 9-4). The bands reflect how far the development has encroached into the river channel (% width) or along the bank (% length). The percentage length is measured as a percentage of the total length of the watercourse within the on-site boundary.

9.29. The in-watercourse encroachment multiplier does not apply to culverts. The 'N/A – culvert' option should be used.

TABLE 9-4: Description of in-watercourse encroachment bands

In-watercourse encroachment band	Multiplier	Description	Examples
No encroachment	1.0	<5% bank length comprising an engineered bank revetment **and** no encroachment into channel	
Minor	0.8	5%-20% bank length comprising engineered bank revetment **or** encroachment up to 10% channel width	Small headwalls, jetties, pontoons
Major	0.5	>20% bank length comprising an engineered bank revetment **or** encroachment >10% of the channel width	Weirs, large headwalls, bank revetment.

*Note: Interventions such as woody material dams, beaver dams, soft bank revetment, such as coir rolls or willow spilling, that have been included to improve the 'condition' of the river and reinstate natural riverine hydro-morphological and geomorphological processes, are **excluded** from in-watercourse encroachment multipliers.*

Strategic significance

9.30. The purpose of the strategic significance multiplier is outlined in Chapter 5. For rivers and streams use the delivery of identified actions within River Basin Management Plans, Catchment Plans and Local Plans to determine high strategic significance.

TABLE 9-5: Strategic significance multipliers for rivers and streams

Strategic Significance	Description of multiplier	Strategic multiplier
High	Delivery of river restoration actions within: • Local Plans; • Local Nature Recovery Strategies; • River Basin Management Plan; • Catchment Plans; • Catchment Planning System; or • Priority Habitats for Restoration[54]	1.15
Low	Low potential / action not identified in any plan.	1

Risks

Difficulty of creation and enhancement of rivers and streams

9.31. Rivers, by their nature, cannot be created. However, there can be circumstances where new artificial **river channels** are 'created'. In most instances, rivers will be enhanced through positive management and restoration.

9.32. Where new, engineered watercourses are created the difficulty of creation is high due to the complexity of the work. For culverts, canals and ditches difficulty of creation is low. Enhancement difficulty is defined as medium for all rivers and streams habitat types (see Table 8-8).

9.33. In biodiversity metric 3.1 creation and enhancement for rivers and streams are defined in Table 9-6.

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[54] Contact the local catchment partnership for information: FRESHWATER BIOLOGICAL ASSOCIATION. (2022) *Discovering Priority Habitats in England* [online]. Available from: Contribute restoration priorities data – Discovering Priority Habitats in England

TABLE 9-6: Definition of creation and enhancement

Type of intervention	Definition	Example
Creation	Creation of watercourses that do not promote natural functions and processes or the development of natural habitats.	Trapezoidal channels, culverts, diverted channels outside of their natural alignment.
Enhancement	Enhancement of watercourses to promote natural function, processes and the development of natural habitats.	Re-aligning rivers closer to their natural alignment, the introduction of large woody material, brash berms, improvement in the complexity or connectivity of the riparian zone.

TABLE 9-7: Difficulty of creation and enhancement multipliers for rivers and streams

Type of intervention	Difficulty category	Multiplier
Creation of: Priority Habitat rivers Other rivers and streams	High difficulty	0.33
Enhancement of: All rivers and streams habitat types	Medium difficulty	0.67
Creation of: Ditches Culverts Canals	Low difficulty	1

Applying river creation and enhancement through the metric: Accounting for losses of 'area' habitat and increases in the length of restored river channels

9.34. Excavated new channels will create a loss in 'area' habitats. Mitigating this loss can, for example, include using redundant river channels (if a new one has been excavated) to create an 'area' habitat such as reedbed or wet woodland.

9.35. Where a scheme restores a channel the length of the final river channel following enhancement may be longer than the original river baseline. This may be due to increasing the number of meander bends or by including a by-pass channel. See Step 6 (k-n) in Chapter 3 for details of how this can be accounted for in biodiversity metric 3.1.

Time to create, enhance or restore

9.36. Time to target condition is related to the condition classification, and how far restoration efforts change the condition status. The time is based on the complexity of intervention needed to raise condition and the lag time needed for the biological communities to re-establish. Table 9-8 shows the predicted time to target condition for the enhancement/restoration of river and streams habitats and Table 8-10 for their creation.

TABLE 9-8: Time to target condition for <u>enhancement/restoration</u> of rivers and streams habitats

Time to target condition for enhancement/restoration of rivers and streams	
Condition change	**Time (years) to target condition**
Poor - good	8
Poor - fairly good	6
Fairly poor - good	6
Poor - moderate	4
Fairly poor - fairly good	4
Moderate - good	4
Poor - fairly poor	2
Fairly poor - moderate	2
Moderate - fairly good	2
Fairly good - good	2

TABLE 9-9: Time to target condition for <u>creation</u> of rivers and streams habitats

Condition class	**Time (years) to target condition**
Good	10
Fairly good	8
Moderate	5
Fairly poor	2
Poor	1

Spatial risk

9.37. Use WFD waterbody and catchment boundaries to determine the spatial risk created by delivering offsets in different locations.

TABLE 9-10: Spatial risk multipliers for rivers and streams

Description of multiplier	Spatial risk multiplier
Within waterbody	1.0
Outside waterbody	0.75
Outside catchment	0.5

Trading within river type

9.38. Applying the trading rules of the metric (Rule 3), compensation needs to deliver benefits to the same river type as impacted (e.g. rivers and streams, canals, ditches). I.e. Ditch creation/enhancement cannot be used to compensate for impacts on rivers and canals (or vice versa).

Note: if the creation/enhancement of a ditch materially improves the overall condition of a river/canal, then this may be an acceptable approach. However, any deviation from trading rules would need to be agreed with the determining authority.

9.39. Off-site delivery should be located on the same rivers and streams habitat type (i.e. river replaced with river, ditch with ditch, etc). The only exception to this is 'culvert' which can move habitat/distinctiveness type.

9.40. For rivers, offsetting should ideally be provided on reaches of the same waterbody/catchment (see spatial risk multiplier). An offset should be on a section of river of a similar size, function and stream order, where the same hydrological and geomorphological processes give rise to similar river habitats in a natural state. For example, impacts on a headwater cannot be offset on large lowland rivers. Exceptions to this rule will need to be agreed with the determining authority.

Red line boundary

9.41. The riparian zone is an intrinsic part of the ecological functioning and natural processes occurring in the river. Where the red line boundary of the development encompasses the riparian zone, either whole or in part, but excludes the channel of the watercourse, the rivers and streams metric (including the condition assessment) must be applied. This applies to rivers, streams and canals as the riparian zone is used to calculate its condition. The riparian zone of a ditch is not used to influence condition, therefore would not apply.

9.42. By applying the river metric in this scenario, information will be required that is outside of the red line boundary (as it includes the banks, channel and bed of the river).

Note: in this case, you would not use the off-site option within the metric tool (although, outside the red line boundary).

BOX 9-3: Case study - results through planning

Cornmill Gardens, River Ravensbourne

The river restoration scheme formed part of the 'Urban Renaissance in Lewisham' programme which aimed to create a new public open space within the town centre. The objective of the scheme was to remove the river from its concrete banks and create an attractive public open space. The river was restored by removing the concrete walls, regrading banks, improving riparian habitat and marginal planting, and installing gravels in the river channel. The scheme has improved this section of river for people, wildlife and flood risk.

Before

After

10:   Using biodiversity metric 3.1 with other metrics

10.1.   The three types of biodiversity units generated by biodiversity metric 3.1 (area, hedgerows and lines of trees, rivers and streams) are unique and the units are also different from those generated by other biodiversity metrics, including previous versions of this biodiversity metric (e.g. biodiversity metric 2.0). This means it is important that the same metric is used consistently throughout all elements and stages of a project, including for calculating any off-site habitat provision, to ensure consistency and comparability. You cannot sum across or between, nor can you compare the outputs from, different biodiversity metrics.

10.2.   There may be situations where a project wishes to use a metric approach to quantify other environmental factors, such as ecosystems services or impacts on a specific species. It is perfectly acceptable to use the biodiversity metric 3.1 alongside other metrics so long as you to remember that each metric is a distinct entity, and the units of each metric must be kept separate in any metric 'account'. You cannot sum the units of different metrics to give an overall value as the units are not equivalent and this could lead to double counting.

Species metrics

10.3.   Biodiversity metric 3.1 uses habitats as a proxy for wider biodiversity. It does not explicitly seek to measure or meet the needs of individual species, although many can expect to benefit from the creation of new or enhanced habitats.

10.4.   Some projects may choose to use a separate metric, designed for a specific species, to calculate the scale of compensation needed to address impacts on a species. For example, a metric designed for great crested newts is used to calculate the number of ponds required to compensate for pond losses under Natural England's District Level Licensing schemes.

10.5.   Where a species metric is used in a project the rules set out in Figure 10-1 below should be applied to ensure metric use is compatible with the biodiversity metric 3.1. Any habitat retained, enhanced or created to meet species licensing requirements can be evaluated using biodiversity metric 3.1 to provide a full account of biodiversity changes. Box 10-1 illustrates how a species metric can be used alongside biodiversity metric 3.1.

|	Species rules
Species rule 1	Species metric(s) are a distinct entity and an evaluation of 'species biodiversity units' must be kept separate in any 'account' of the effects of an intervention on biodiversity. You <u>must not</u> sum habitat and species units to derive a total biodiversity unit value.
Species rule 2	Species metric(s) can be used as an additional source of information to complement information provided by biodiversity metric 3.1. It is important that the habitat-based metric is used as the primary tool for evaluating biodiversity change. Using a species metric in isolation can result in significant risk of net loss in biodiversity.
Species rule 3	A species metric needs to be consistent with all key principles of the biodiversity metric 3.1, particularly the principle that the metric does not change the protection afforded to biodiversity (Principle 1).
Species rule 4	The legal provisions that apply to protected species (and habitats) take precedence in designing and planning the approach used to mitigate or compensate for impacts on species. An acceptable design must satisfy these legal requirements, even if this does not result in the best possible biodiversity unit outcome (based on evaluation using the biodiversity metric 3.1).
Species rule 5	It is acceptable for the same area of habitat to be separately scored using the biodiversity metric 3.1 and one or more species metrics. Because each metric describes the value of that habitat from a distinct perspective the corresponding outputs represent a different 'biodiversity currency' and must not be summed.

FIGURE 10-1: Species Rules

BOX 10-1: Using species and habitat metrics together

Where a species metric is used by a project, it should be used alongside biodiversity metric 3.1 to give a broad understanding of the impact of an intervention on biodiversity.

The effects of an intervention on both a species present on a site and on the habitats at that site should be scored separately using their respective metric. Although the outputs of the two metrics are recorded separately this does not increase the level of compensation required. The need to satisfy a target level of units for each (e.g. to achieve 'no net loss') may, however, have a bearing on design and location of compensation.

If, for example, a development destroys an area of grassland that provides an important terrestrial habitat for a protected species population, it may be that compensating for the grassland loss at an off-site location can satisfy the biodiversity metric 3.1 unit requirement to achieve no net loss, but be too remote or unsuitable for the protected species population. By the same measure, locating the new grassland habitat at a location that is ecologically more important to protected species could create a greater net benefit for the species for the same number of biodiversity metric units.

The example below illustrates how species and habitat metrics can work in parallel.

Impact site

Pre-impact
- 100 habitat units
- 30 species units

Retained habitat A
- 25 habitat units
- 25 species units

Compensation sites

Created habitat B
- 50 habitat units
- 10 species units

Created habitat C
- 25 habitat units
- 0 species units

Biodiversity unit accounts	Pre-impact site units	Site A units	Site B units	Site C Units	Overall change Compensation – Impact	Outcome
Habitat units	100	50	25	25	(50+25+25)-100=0	NNL
Species units	30	10	0	25	(10+0+25)-30=+5	Net Gain

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12: Glossary

AHBU	Area habitat biodiversity unit. The unit of measurement used for 'Area habitats' in biodiversity metric 3.1.
ADDITIONALITY	The need for a compensation measure to provide a new contribution to conservation, additional to any existing values, i.e. the conservation outcomes it delivers would not have occurred without it. *Source*: McKenney and Kiesecker (2010).
BIODIVERSITY	An abbreviation of 'Biological diversity'. The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. *Source: CBDCBDCBD (2006).*
COMPENSATION	Measures to 'make good' the loss of habitats/biodiversity caused by an action. A more general term than biodiversity offset, which is one type of compensation. Compensation may achieve No Net Loss (in which case it is an offset) or it may involve reparation that falls short of achieving no net loss (and is therefore not an offset). *Source: adapted from International Union for Conservation of Nature (IUCN) (2016)*
ECOLOGICAL EQUIVALENCE	In the context of biodiversity offsets, this term is synonymous with the concept of 'like for like' and refers to areas with highly comparable biodiversity components. This similarity can be observed in terms of species diversity, functional diversity and composition, ecological integrity or condition, landscape context (e.g. connectivity, landscape position, adjacent land uses or condition, patch size, etc.), and ecosystem services (including people's use and cultural values). *Source: BBOP (2012b).*
ECOLOGICAL FUNCTIONALITY	The role and function that a habitat and supporting processes play in supporting an ecosystem. A habitat may be considered to have achieved ecological functionality when it fully supports all of the typical or target species.
ECOSYSTEM	A biological community of interacting organisms and their physical environment
FEP	Farm Environment Plan
HABITAT	The place or environment in which plants and animals live
HBU	Hedgerow biodiversity unit. The unit of measurement used for hedgerows and lines of trees in biodiversity metric 3.1.

IRREPLACEABLE HABITATS	'Habitats which would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity.' Definition taken from the [National Planning Policy Framework](#)
METRIC	A set of measurements that quantifies results
NET GAIN	Net gain is an approach to development, and/or land management, which aims to leave the natural environment in a measurably better state than beforehand.
NO-NET-LOSS (NNL)	Impacts caused by a project are balanced by biodiversity gains through compensation measures implemented in the locality of the project. The biodiversity changes need to be evaluated against a baseline (e.g. a reference point or trajectory without the project occurring, or prior to the project occurring) of the relevant biodiversity features (in this case the habitats) being impacted by the project. From a conservation perspective, achieving a NNL goal for a given project ultimately (i.e. in the long-term) means no net reduction in the: • diversity within and among species and vegetation types; • long–term viability of species and vegetation types; and • functioning of species assemblages and ecosystems, including ecological and evolutionary processes.
OFFSETS	Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation actions have been taken. The goal of biodiversity offsets is to achieve No Net Loss and preferably a Net Gain of biodiversity on the ground, with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity. Source: BBOP (2012a).
RBU	River biodiversity unit
WFD	Water Framework Directive