



Biodiversity Metric 4.0: what's it all about?

On 24 March 2023 Natural England published Biodiversity Metric 4.0. This revised metric will revolutionise the way we value urban tree habitats, making it clearer than ever that they are a very important habitat.

It is anticipated that BNG 4.0¹ will be given statutory force when the biodiversity elements of the 2021 Environment Act² (EA 2021) take effect later this year (see [Measuring biodiversity net gain - Publication of Biodiversity Metric 4.0](#)). All new planning applications issued after 24 March, where a Biodiversity Net Gain (BNG) calculation is required will be required to use it.

Unlike several neighbouring local authorities (e.g., [BANES](#) & [South Gloucestershire County Council](#)), which have already adopted Supplementary Planning Documents to protect their biodiversity, Bristol City Council has decided not to require this as part of current planning applications until the rest of the EA 2021 comes into force. The failure to do this will have a negative ecological and social impact for the many current planning applications. In the meantime, only developers will benefit.

Given Bristol's [declaration of an ecological emergency in](#) 2020, BNG 4.0 must now be implemented in Bristol. This is a key environment measure which could be adopted at no cost to the council

The NPPF basis for achieving biodiversity net gain

Paragraph 180 a) of the National Policy Planning Framework³ (NPPF) echoes the overarching Mitigation Hierarchy principles and obliges local planning authorities to refuse planning permission:

if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for...

Paragraph 179 c), states that plans should:

...pursue opportunities for securing measurable net gains for biodiversity.

BNG 4.0 has been designed to give effect to these two core planning goals.

Pending planning applications

Natural England advises that:

'Users of previous versions of the Biodiversity Metric should continue to use that metric

¹ <http://publications.naturalengland.org.uk/publication/6049804846366720>

² <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf



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(unless requested to do otherwise by their client or consenting body) for the duration of the project it is being used for. This is because users may find that certain biodiversity unit values generated in biodiversity metric 4.0 will differ from those generated by earlier versions.'

Given that the approach to valuing urban trees has fundamentally changed, we urge all 'consenting bodies' (LPAs for most of us) to require developers to adopt this new methodology, for **Individual trees** habitats at least.

We have always argued that the old **Urban tree** habitat area calculation methodology used in BNG 3.0 is flawed and unworkable, and we advocated for the use of the calculation method given in BNG 3.1, if only for Urban tree habitat area calculations. With the advent of BNG 4.0, we plan now to argue instead for the BNG 4.0 Individual trees habitat methodology to be used.

The BNG 4.0 Guide

Here is a link to the [BNG 4.0 User Guide](#), which was published with BNG 4.0 (the quotes in *italics* below are taken from it). We set out below the salient points that cover most trees growing in an urban setting.

What is Individual trees habitat?

BNG 4.0 has made a substantial change to the way trees growing in the urban space will be valued and introduces a new broad habitat category called **Individual trees** (to replace the *Urban tree habitat* category first published with BNG 3.0):

8.3.1. The broad habitat type 'Individual trees' may be used where a tree (or a group of trees) over 7.5 cm in diameter at breast height (DBH) does not meet or contribute towards the definition of another broad habitat type.

8.3.2. Individual trees should not be recorded separately where they occur within habitat types characterised by the presence of trees, such as orchards, lines of trees or wood-pasture and parkland, but can be recorded where they do not form part of a primary habitat description.

8.3.3. Ancient and veteran trees are irreplaceable habitats and the broad habitat 'Individual trees' must not be used to record these.

Even though all irreplaceable habitats fall outside BNG 4.0, they should still be recorded in the metric calculation. A special form for this has been built into the calculator and special rules apply.

Note: Paragraph 8.3.1 refers to trees 'over 7.5 cm in diameter' but table 8-1 below refers to trees that are 'greater than 7 cm'. BS5837:2012 requires all trees 75 mm or over to be surveyed - at paragraph 4.2.4.

Broad habitat type **Individual trees** can be in either 'urban' or 'rural' habitats:

8.3.4. Individual trees may be classed as 'urban' or 'rural'. Typically, urban trees will

be bound by (or near) hardstanding and rural trees are likely to be found in open countryside. The assessor should consider the degree of 'urbanisation' of habitats around the tree and assign the best fit for the location.

8.3.5. Individual trees may also be found in groups or stands (with overlapping canopies) within and around the perimeter of urban land. This includes those along urban streets, highways, railways and canals, and also former field boundary trees incorporated into developments. For example, if groups of trees within the urban environment do not match the descriptions for woodland, they may be assessed as a block of individual urban trees.



Figure 8-1 Trees in the urban environment

Either way, they have the same Medium habitat distinctiveness, so the difference is perhaps academic.

Developers may seek to argue that some urban trees in groups or blocks are a woodland habitat or a 'Hedgerow - line of trees' habitat and not **Individual trees** habitat. BNG 4.0 and earlier versions use a different approach to calculating their habitat sizes. This approach is based on canopy area for woodland habitats and a linear measurement for 'Hedgerow - line of trees' habitats. However, it is the degree of '**urbanisation**' that is key.

Trees in private gardens

Individual trees habitats within private gardens are also to be recorded in the baseline calculation, but should not form part of the post-development BNG calculation:

8.3.6. Established trees within gardens should be recorded in a site baseline.

8.3.7. Where private gardens are created, any tree planting within the created garden should not be included within post-development sheets of the metric. The habitat type 'Urban - Vegetated garden' should be used.

This is an important distinction and means we should be alive to any attempt to include newly created habitat in private gardens into post-development BNG calculations. The logic is that, as private space is outside the control of the developer, any post-development habitat



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management obligations they have cannot be applied to these spaces, and so should be excluded from the post-development calculation.

Measuring Individual trees habitat size

Habitat size is one of the key parameters used for calculating a habitat's value - called Habitat Units (HUs). For baseline area habitats, the formula is based on four parameters:

$$HU = \text{Area in hectares} \times \text{Distinctiveness} \times \text{Condition} \times \text{Strategic significance}.$$

Note: For linear habitats, length in kilometres is used instead of area.

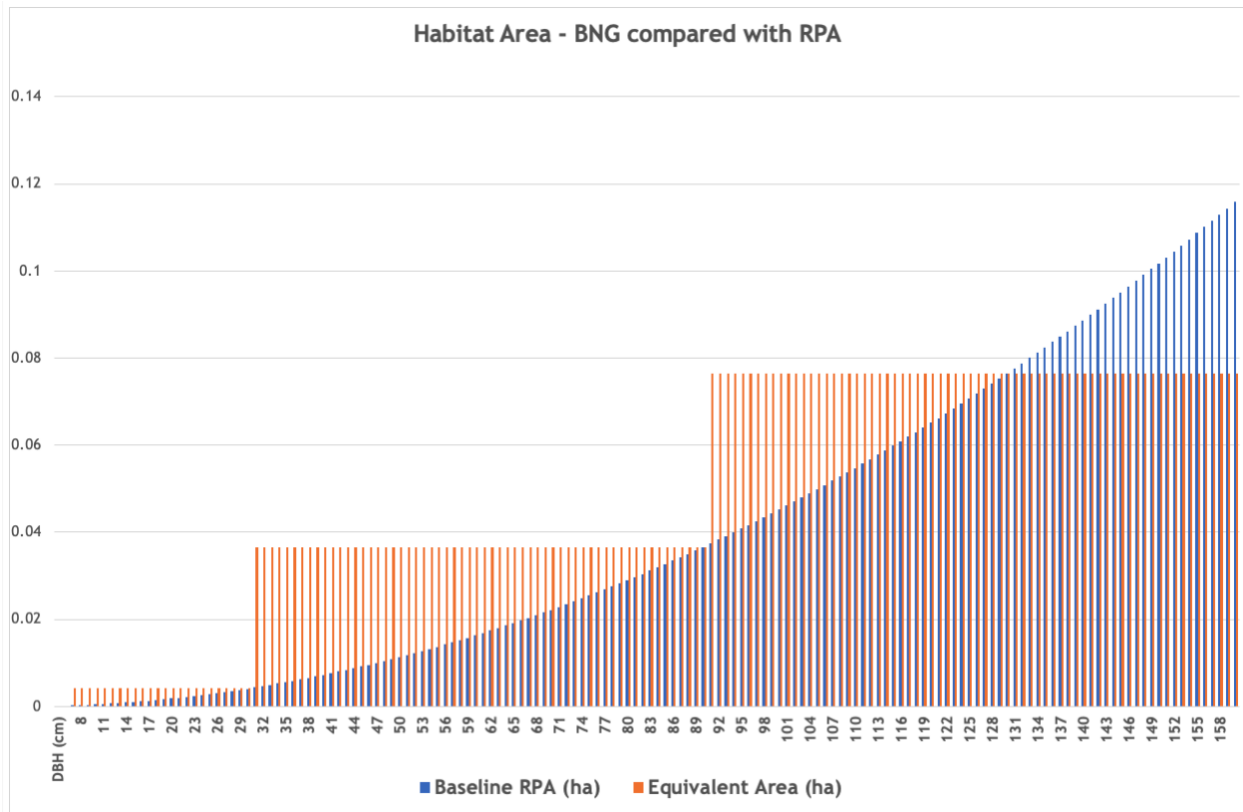
The way BNG 4.0 measures the habitat area of Individual trees has reverted to the methodology used in BNG 3.0 but, thankfully, now uses a table that works!

The effect is far more generous than the one used in BNG 3.1 as it values all the trees in the bottom two categories, **Small & Medium**, at the top of their range. All **Large** category trees are given the same habitat value as a tree with a stem diameter (called DBH - diameter at breast height) of 130 cm.⁴ Given that the vast majority of urban trees fall within this range - with DBHs between 7cm and 130 cm - this has the effect of greatly enhancing their habitat value.

The following graph illustrates the effect on a range of DBHs from 7 cm to 160 cm; RPA refers to root protection area and the orange stepped lines are the BNG 4.0 habitat area values assigned to each DBH.⁵

⁴ This is a girth of 4.08 metres.

⁵ This is the spreadsheet it is based on - [BNG 4.0 - Individual trees BNG Analysis.xlsx](#)



This difference is significant. For example, in a recent application we were involved with, trees on the site that had a baseline *Urban tree* habitat area of 0.7056 ha using BNG 3.1 now have an **Individual trees** habitat area of 3.1137 ha when the BNG 4.0 methodology is applied. This makes their habitat unit value much greater than it was before.

Here is the BNG 4.0 **Individual trees** habitat area measurement methodology:

8.3.8. Once the size, number and condition of trees is known, assessors should generate an area equivalent value using the ‘Tree helper’ within the metric tool ‘Main menu’ (Figure 8-2). The ‘area equivalent’ is used to represent the area of Individual trees. This value is a representation of canopy biomass, and is based on the root protection area formula, derived from BS 5837:2012.

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

Figure 8-2 The tree helper embedded within the metric tool

8.3.9. Table 8-1 sets out class sizes of trees and their area equivalent. For multi-stemmed trees the DBH of the largest stem in the cluster should be used to determine size class.

Table 8-1 Tree size classes and area equivalents

Size class	Diameter at breast height (cm)	Metric RPA radius (m)	Metric area equivalent (ha)
Small	greater than 7cm and less than or equal to 30cm	3.6	0.0041
Medium	greater than 30cm and less than or equal to 90cm	10.8	0.0366
Large	greater than 90cm	15.6	0.0764

Note: The correct metric equivalent area of **Large** category trees is 0.0765, not 0.0764.

This same approach applies to **Individual trees** habitats in groups or blocks:

8.3.12. Assessors should account for the size class (Table 8-1) of each Individual trees within a group or block. The number of Individual trees present within a group or block should be entered into the tree helper to calculate area equivalent. Do not reduce any area generated by the tree helper even if tree canopies overlap.

Assessing baseline Individual trees habitat condition

As ‘condition’ is one of the parameters used for calculating the habitat’s value, each Individual



trees habitat tree, group or block needs to be assessed against the following criteria.⁶

Condition Assessment Criteria	
A	The tree is a native species (or at least 70% within the block are native species).
B	The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5 m wide (Individual trees automatically pass this criterion).
C	The tree is mature (or more than 50% within the block are mature).
D	There is little or no evidence of an adverse impact on tree health by human activities (such as vandalism, herbicide or detrimental agricultural activity). And there is no current regular pruning regime, so the trees retain >75% of expected canopy for their age range and height.
E	Natural ecological niches for vertebrates and invertebrates are present, such as presence of deadwood, cavities, ivy or loose bark.
F	More than 20% of the tree canopy area is oversailing vegetation beneath.
Number of criteria passed	
Condition Assessment Result (out of 6 criteria)	Condition Assessment Score
Passes 5 or 6 criteria	Good (3)
Passes 3 or 4 criteria	Moderate (2)
Passes 2 or fewer criteria	Poor (1)

⁶ See [Biodiversity Metric 4.0 - Technical Annex 1 - Condition Assessment Sheets and Methodology](#) & [Biodiversity Metric 4.0 - Technical Annex 2 - Technical Information](#)



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Note that 'Fairly Good and Fairly Poor' condition categories are not available for this broad habitat type.

In our experience, very few **Individual Urban tree** habitats will ever be assessed as in 'Good' condition and many will only ever achieve a 'Poor' score. Many urban trees are not native,⁷ few survive to become mature, most are subject to some form of management or show 'evidence of an adverse impact on tree health by human activities', and most trees in a public space will never be allowed to develop 'natural ecological niches' as these often also present a public safety risk.

The same challenges will also apply when attempting to assess the future condition of post-development **Individual Urban tree** habitats after 30 years have passed (we discuss this below). In our view, every such tree should always be assessed as having a 'Poor' outcome given the uncertainties they face.

Assessing baseline Individual trees habitat strategic significance

Strategic significance is the fourth parameter used in calculating HUs. There are three categories - High, Medium and Low:

⁷ See table 2 of the Woodland Condition Survey forms linked to <https://woodlandwildlifetoolkit.sylva.org.uk/assess> for the list of recognised native tree and shrub species.

Table 5-3 Metric strategic significance categories, scores and descriptions

Strategic significance category	Score applied in the metric	Description
High	1.15	Where the location has been identified within a local plan, strategy or policy as being ecologically important for the specific habitat type or where that habitat has been identified as being locally ecologically important.
Medium	1.10	Where there is no relevant plan, strategy or policy in place, professional judgement may be used to justify the use of the medium strategic significance category. This judgement should consider the importance of that habitat in providing a linkage between other strategic locations.
Low	1	If the habitat is not included in local plans, strategy or policy, and there is no evidence to suggest that the habitat is of medium strategic significance.

To qualify as ‘High’, the following evidence needs to be available:

5.4.3. Assessors must provide evidence by referencing relevant documents. If published, the relevant strategy is the Local Nature Recovery Strategy (LNRS). If an LNRS has not been published, the relevant consenting body or planning authority may specify alternative plans, policies or strategies to use.

5.4.4. Alternative plans, policies or strategies must specify suitable locations for habitat retention, habitat creation and or enhancements, and might, for example, be:

- *Local Plans and Neighbourhood Plans*
- *Local Planning Authority Local Ecological Networks*
- *Tree Strategies*
- *Area of Outstanding Natural Beauty Management Plans*
- *Biodiversity Action Plans*
- *Species and protected sites conservation strategies*
- *Woodland strategies*
- *Green Infrastructure Strategies*
- *River Basin Management Plans*
- *Catchment Plans and Catchment Planning Systems*



- *Shoreline management plans*
- *Estuary Strategies*

5.4.5. *If no alternative is specified, agreement should be sought from the consenting body or Local Planning Authority when determining strategic significance.*

In many cases, the proposed development site will fall within one of the criteria above (especially where the authority has adopted a well-designed tree strategy) and so should be given 'High' strategic significance.

If it does not then, given that trees nearly always provide 'a linkage between other strategic locations', we suggest that **Individual trees habitats** should always be assigned 'Medium' strategic significance.

It is notable that the Medium strategic significance dropdown option in the Metric calculator is still labelled '*Location ecologically desirable but not in local strategy*'. This suggests a wider definition than is perhaps suggested above.

Post-development Individual trees habitat creation.

Post-development **Individual trees** habitat creation also uses the same parameters for the HU calculation discussed above, but with a time-to-target factor added. This is the time it will take the new habitat to reach its target condition. If the created **Individual trees** habitat condition will be Poor, the time-to-target period is ten years, if it will be Medium, it is 27 years, and if it will be Good, it will be 30+ years.

These periods can be increased or reduced in yearly increments if, somehow, habitat creation has been advanced or delayed.

These are then factored into the calculation to allow for the future habitat created using the 3.5% discount tables - so x 0.700 for ten years, x 0.382 for 27 years and x 0.320 for 30+ years.

The calculation also assesses the difficulty of creating the target habitat. For **Individual trees** habitats, this is pre-set to Low (score 1), so does not affect the eventual calculation.

Existing habitats can also be enhanced on or off site or created off site. We do not discuss this here.

Post-development Individual trees habitat area forecasting

This assumes that any new tree planted will grow into a **Small** category tree at the end of the 'project timeframe'. This is likely to be 30 years by default, as per Part 1 s.9 of Schedule 14 of the 2021 Environment Act.⁸ This is the approach advised in the Guide:

8.3.13. *Size classes for newly planted trees should be classified by a projected size relevant to the project timeframe.*

- *most newly planted street trees should be categorised as 'small'*

⁸ <https://www.legislation.gov.uk/ukpga/2021/30/schedule/14/enacted>

- evidence is required to justify the input of larger size classes.

8.3.14. When estimating the size of planted trees, consideration should be given to growth rate, which is determined by a wide range of factors, including tree vigour, geography, soil conditions, sunlight, precipitation levels and temperature.

8.3.15. Do not record natural size increases of pre-existing baseline trees within post-development calculations.

If a larger **Individual trees** habitat area projection is advanced, this will need to be justified.

The evidence of tree growth rates is patchy at best - see the **About** section in our [Tree Canopy Prediction tool](#). To overcome this, we have adopted the simple rule-of-thumb approach commonly used by arboriculturists and assume that a tree’s girth grows by one inch (2.54 cm) a year. We then apply this to the standard tree sizes adopted in **BS 3961-1 - Nursery Stock Specification to Trees and Shrubs**⁹ to calculate the eventual size of a tree 30 years after it has been planted. In all cases, save for semi-mature trees, the tree will be a BNG 4.0 Small category tree.

Here is the model we use:

British Standard BS 3936-1, Nursery Stock Specification for Trees and Shrubs					
Specification	Tree Girth	Lower (cm)	Upper (cm)	Median DBH (cm)	Estimated Age (yrs)
Light Standard (LS)	6-8cm	6	8	2.23	6
Standard (S)	8-10cm	8	10	2.86	7
Select Standard (SS)	10-12cm	10	12	3.50	8
Heavy Standard (HS)	12-14cm	12	14	4.14	9
Extra Heavy Standard (EHS)	14-16cm	14	16	4.77	10
Advanced Heavy Standard (AHS)	16-18cm	16	18	5.41	11
Semi mature	18 cm +	18	25	6.84	12

⁹ <https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=16650>

1" Annual Tree Growth (cm)	Girth (cm)	DBH (cm)	Project Timeframe (yrs)	DBH by Timeframe					
	2.54	0.8085	30	24.26					
Urban Tree Habitat size 30 years after planting									
Tree Size (BS 3961-1)	Planting DBH (cm)	Eventual DBH (cm)	RPA r (m)	RPA (sq m)	RPA (ha)	BNG 3.1 Size	BNG 4.0 Habitat (ha)	Difference (ha)	
Light Standard	2.23	26.5	3.2	31.7	0.0032	Small	0.0041	0.0009	
Standard	2.86	27.1	3.3	33.3	0.0033	Small	0.0041	0.0008	
Select Standard	3.5	27.8	3.3	34.8	0.0035	Small	0.0041	0.0006	
Heavy Standard	4.14	28.4	3.4	36.5	0.0036	Small	0.0041	0.0005	
Extra Heavy Standard	4.77	29.0	3.5	38.1	0.0038	Small	0.0041	0.0003	
Advanced Heavy Standard	5.41	29.7	3.6	39.8	0.0040	Small	0.0041	0.0001	
Semi-mature	6.84	31.1	3.7	43.7	0.0044	Medium	0.0366	0.0322	

The age of the tree being planted should not be ‘credited’ when calculating the time-to-target period. Sadly, BNG 4.0 does not take account of mortality rates, which are high for urban trees.

The Trading Rules

Individual trees habitats are given **Medium** distinctiveness in BNG 4.0 and so are subject to the Rule 3 Trading Rules:

3.2.1. Rule 3 is automatically applied by the metric and sets minimum habitat creation and enhancement requirements to compensate for specific habitat losses (up to the point of no net loss). These requirements are based on habitat type and distinctiveness, as set out in Table 3-2 (below).

Table 3-2 Trading rules (Rule 3) to compensate for losses

Baseline habitat distinctiveness	Area module (area units)	Hedgerow module (hedgerow units)	Watercourse module (watercourse units)
Very high	Losses are not permitted within this metric AND bespoke assessment and compensation are required	Losses must be replaced with hedgerow units of the same habitat type	Losses are not permitted within this metric AND bespoke assessment and compensation are required
High	Losses must be replaced with area units of the same habitat type	Losses must be replaced with hedgerow units of the same habitat type or of a higher distinctiveness band	Losses must be replaced with watercourse units of the same habitat type
Medium	Losses must be replaced by area units of either: medium distinctiveness habitats within the same broad habitat type OR any habitat from a higher distinctiveness band (from any broad habitat type)	Losses must be replaced with hedgerow units of the same or higher distinctiveness band	Losses must be replaced with watercourse units of the same habitat type

In effect, any habitat losses may not be traded down. In this case, the broad habitat category is **Individual trees**. Given that there are very few habitats with **high** or **very high** distinctiveness that are likely to be either applicable or feasible, this will mean that *Individual trees* habitats will mostly need to be replaced like-for-like.

In our view, urban trees are too important to be substituted by any other, non-tree habitat.

The effect of these rules is that, not only will the proposed project have to achieve at least 10% biodiversity net gain when the Environment Act 2021 takes effect later in 2023, it will also need to comply with the Trading Rules. In some cases, this will mean that far more than the minimum 10% net gain will need to be achieved.

We look forward with interest to seeing how developers will ‘manage’ this new metric.