Environmental Benefits from Nature (EBN) Tool - Beta Release User Guide

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The UK Habitat Classification System is used under licence from UKHab Ltd.

Please see https://ukhab.org/ for further details about the UK Habitat Classification System.

Users should refer to https://ukhab.org/ for the published definitions and detailed methodologies on the recording of habitats.

Contents

1. Introduction

The Environmental Benefits from Nature Tool (EBN tool)[1] is a voluntary decision-support tool that has been developed to work alongside biodiversity net gain and enable wider benefits for people and nature from habitat change. It has been developed by Natural England and the University of Oxford in partnership with Defra, the Forestry Commission and the Environment Agency to support Government's 25 Year Environment Plan commitment to *expand net gain approaches to include wider Natural Capital benefits such as flood protection, recreation and improved water and air quality.*

The EBN tool is designed to be used in conjunction with Biodiversity Metric 3.0. Once biodiversity net gain has been demonstrated using the Biodiversity Metric, the EBN tool can be used to identify opportunities to enhance ecosystem service provision and to avoid then minimise any negative impacts. It can help to inform better project design by indicating potential gains or losses in the supply of ecosystem services and can help to make negotiation over land-use change more transparent for all stakeholders. The EBN tool is a scoping tool and is intended to be used alongside a suite of other approaches, including Environmental Impact Assessments (where required) and detailed impact assessments, such as on flood risk or air quality, where necessary.

The EBN tool is based on scores (on a scale of 0-10) for the ability of different types of land cover to deliver 18 ecosystem services, based on a literature review and expert consultations. The scores are modified by applying multipliers based on 40 indicators of habitat condition and spatial location, and then multiplied by the area of habitats, as well as by multipliers to reflect delivery risk and the time taken for new habitats to reach their target condition. This calculation is performed first for the habitats in the baseline (before change) and then for the habitats after the planned development or other land-use intervention (which should deliver biodiversity net gain – as outlined on section 1.3 of the EBN Principles Document). The results indicate the change in provision of ecosystem services from the baseline to the post-development situation.

This user guide explains how to operate the tool. It should be used together with:

- **The Principles of the Environmental Benefits from Nature (EBN Tool) approach**. This explains the overall approach and summarises good practice principles, caveats and limitations. This is crucial in ensuring that the tool will be applied correctly as part of the biodiversity mitigation hierarchy and will not lead to perverse outcomes. It is strongly recommended that this document should be read before operating the tool.

[1] The EBN Tool was known as the 'Eco-metric' throughout its development phase from 2017 to 2021

- **The Data Catalogue**, which explains how to determine values for the condition indicators and spatial factors.

A simplified ‘quick start’ version of the guidance below is also provided on the ‘Instructions’ tab within the EBN tool for ease of reference.

2. Getting started

2.1 Hardware and software requirements

The tool is designed to be used with Microsoft Excel from version 2012 onwards. It does not work well with earlier versions, including Excel 1997-2003 or Excel Online, as there is loss of functionality. The tool was built and tested in MS Windows. It has only been briefly tested on a Mac and, while it appeared to work, any users wishing to use it on a Mac should be vigilant in case there is any loss of functionality.

Three versions of the spreadsheet are available:

1. Short empty version (500 rows) suitable for relatively simple projects
2. Short version with an example filled in, for information only
3. Long version (5000 rows) for larger or more complex projects.

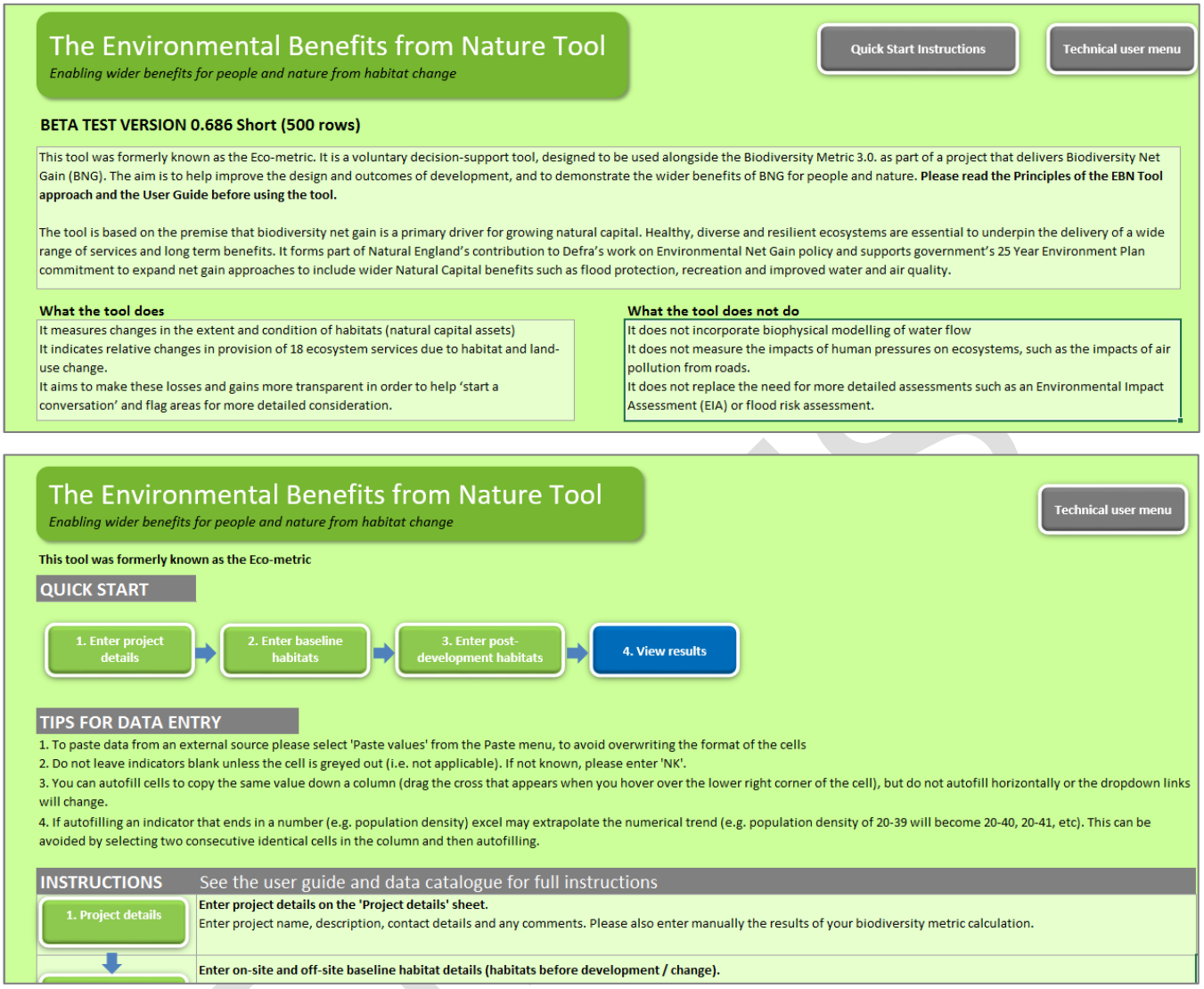
When you open the tool, you may see a prompt saying ‘Macros have been disabled. Click to enable content’. Click on OK. The tool uses a few simple macros, e.g. to hide and un-hide sheets that are not being used.

Please note that the tool is saved as an Excel binary workbook (.xlsb extension) simply because this reduces the size of the file by about half and thus improves performance. When saving a copy of the tool please always save as an Excel binary workbook.

2.2 The Welcome and Quick Start Instructions sheets

The Welcome sheet provides a brief overview of the tool, states the version number and whether this is the long or short version. The Quick Start button provides brief instructions and links to the main data entry and results sheets. The Technical user menu provides access to all sheets in the workbook (see Section 2.6), but most users will not need to access these (see Appendix 1 for details of the other sheets).

Figure 1. The Welcome and Quick Start Instructions sheets



The tool contains three data entry sheets (green tabs):

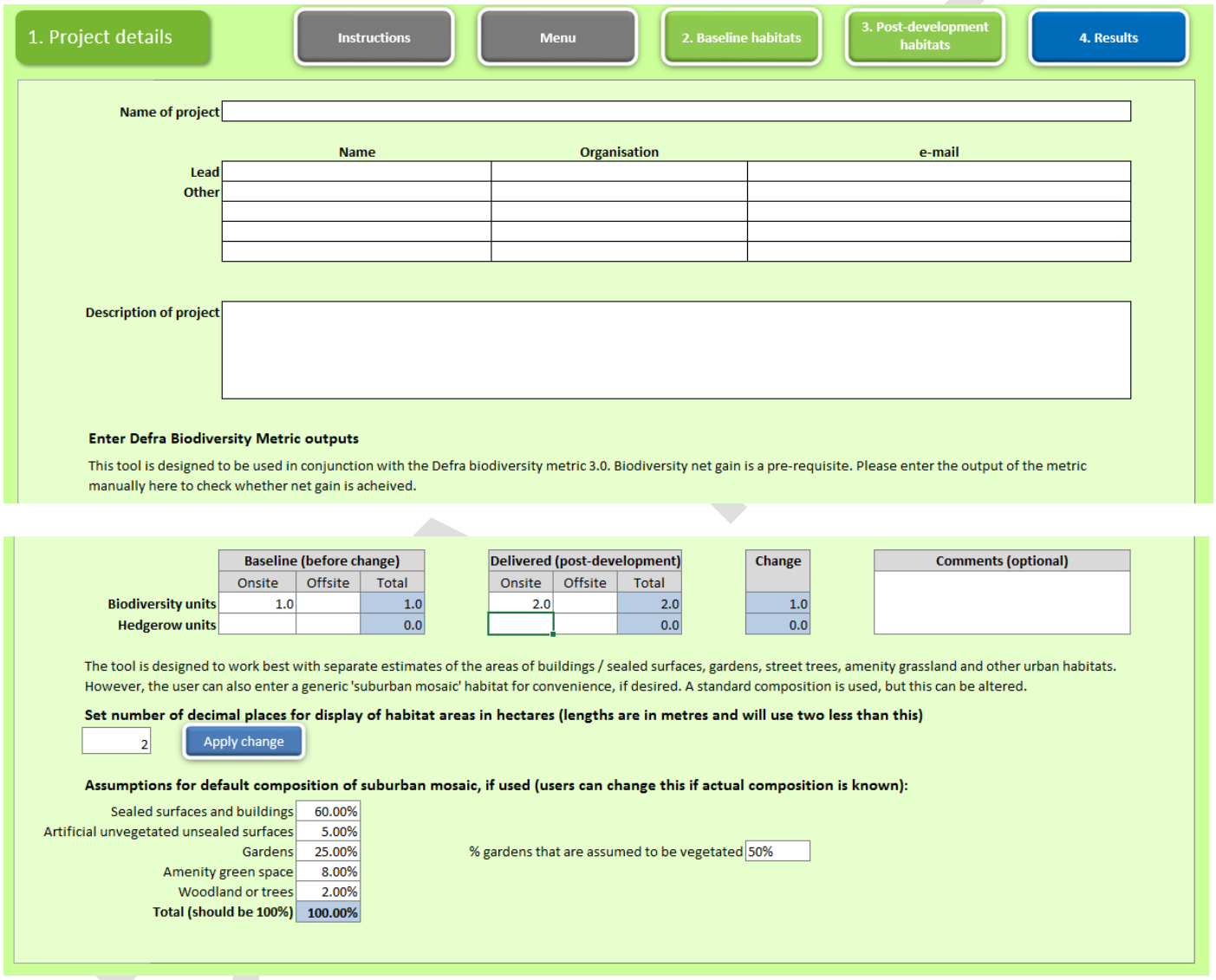
1. Project details
2. Baseline habitats
3. Post-development habitats.

2.3 The Project Details sheet

Start by filling in the white cells in the 'Project details' sheet (Figure 2). You can enter names and contact details of people working on the EBN tool assessment, a title and a brief description of the project. If you are testing alternative design options, make a copy of the EBN tool spreadsheet for each option. The description box can be used to describe each option. There is a larger space for optional notes below these details.

In order to demonstrate that biodiversity net gain has been achieved, please manually enter the results of your biodiversity metric assessment on this sheet. These results are for information only – they are not used in the EBN tool calculations. Alternatively, the EBN tool can be used to inform the design of a biodiversity net gain project, in which case you do not need to enter anything in these cells at this stage.

Figure 2. The Project details sheet



2.4 Setting the number of decimal places for areas, lengths and widths

The Project details sheet allows users to select the number of decimal places that will be used for habitat areas (in hectares) on the data entry sheets, choosing from 2, 3 or 4 decimal places. The options of 3 or 4 decimal places make it easier for users to enter and view data for very small sites.

2.5 Defining ‘suburban mosaic’

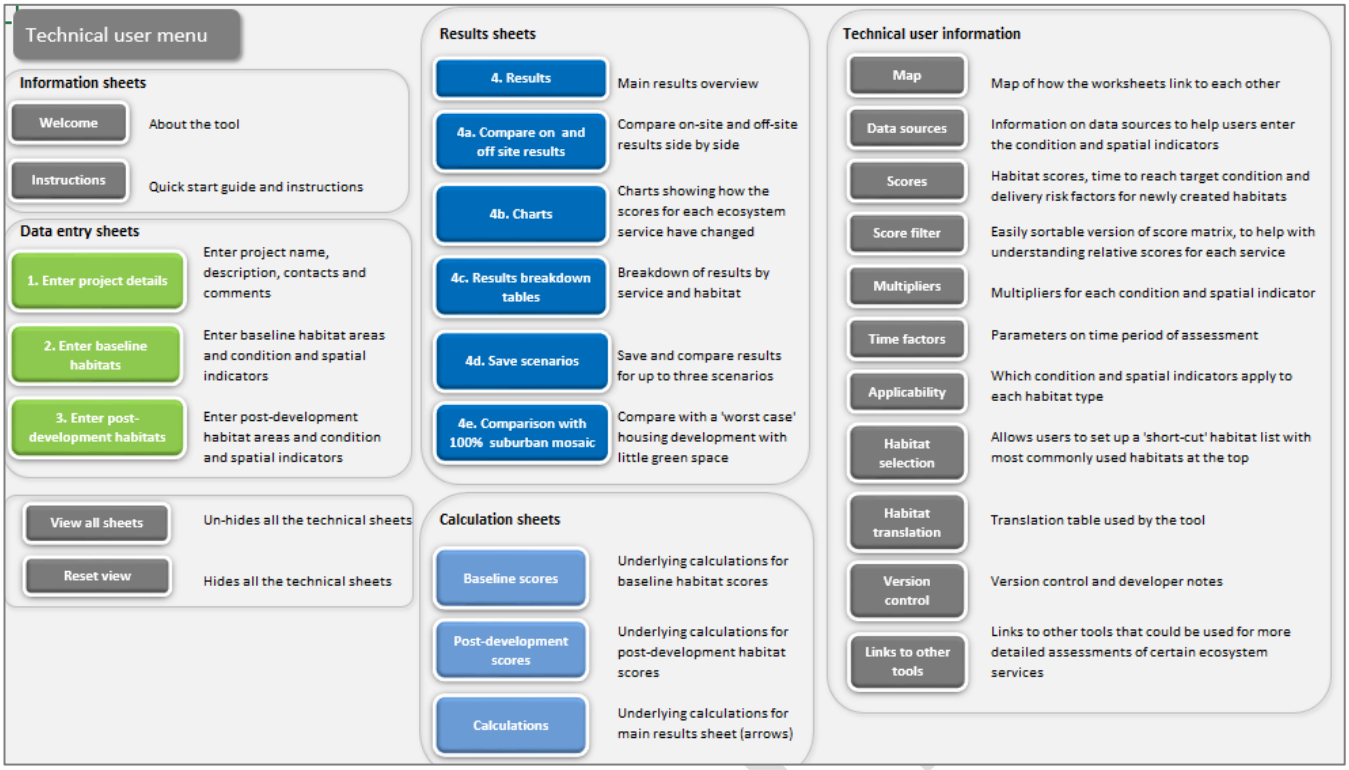
This sheet also provides a facility to define a ‘suburban mosaic’ habitat based on specific proportions of sealed surfaces (buildings, roads, car parks etc.), gardens, amenity grass and woodland, including a parameter to estimate what percentage of gardens are vegetated. It is preferable to specify these habitat types separately when entering data, but the ‘mosaic’ can be used to provide a default estimate if the exact layout of a new development is not yet known. Scores for the suburban mosaic are calculated within the tool by weighting the scores for the individual habitats (sealed surfaces, gardens etc.) according to the proportions defined here. The tool is supplied with a ‘typical’ suburban mosaic, but you can change this on this sheet if your development has a different mix of habitats.

Next you need to fill in the habitat data (see Section 3) and indicators (see Section 4) on the two main data entry sheets: baseline habitats and post-development habitats. While you are in the process of filling in these sheets, you will see errors on the Results sheet, but once they are filled in correctly the results will appear as shown in Section 5.

2.6 Technical menu

The EBN tool is designed to be simple to use yet transparent. When the tool is first opened only the essential data entry sheets and the results sheet are displayed. However, all the sheets used within the tool are available from the technical user menu, accessible from the Menu button at the top of each worksheet. This gives access to the underlying scores and multipliers, the habitat translation tables, and the calculation sheets (see Appendix 1 for full list). You can also reset to the default view in which only the essential sheets are displayed, or unhide all the sheets instantly.

Figure 3. Technical Menu



3. Entering habitat types and areas

3.1 Data structure

The EBN tool is designed to be used together with the Biodiversity Metric 3.0. It can be used to assess housing or infrastructure developments or changes in land use and management which affect habitat type and condition – though it is not designed to capture the fine detail of projects which only involve subtle changes in habitat condition, such as improvements to land management.

Both the EBN tool and the Biodiversity Metric require data on the area of habitats (or length and width for linear habitats such as hedgerows, rivers and streams) for:

- **On-site: the area affected by the development or intervention**, including the site and any surrounding areas where habitats and/or their condition will be directly or indirectly affected:
    - Before development or intervention (baseline).
    - After development or intervention (post-development /biodiversity net gain delivery).
- **Any off-site areas used to create or restore habitats** as part of the development's biodiversity net gain delivery:

- Before habitat creation and/or restoration (baseline)
- After habitat creation and/or restoration (post-development /biodiversity net gain delivery).

Typically, the habitat areas for the baseline (before intervention) could be derived from a habitat survey using JNCC Phase 1 or UKHab, while after development the habitat areas could come from a Masterplan, Ecological Impact Assessment (EcIA), detailed site design or biodiversity net gain management plan.

In this user guide we will refer to 'parcels' of habitat. A parcel is simply a continuous block of habitat as defined on a map, such as a field or garden. Parcels before development do not have to be the same size and shape as parcels after development. There are two main approaches for entering habitat data:

1. For relatively small and simple developments or interventions you can enter a separate row for every parcel of habitat.
2. For large and complex developments with thousands of parcels, you can aggregate parcels of the same habitat into groups that have the same values for all the condition and spatial indicators and enter each group on a single row.

It is best not to start entering habitat data until you know whether you need to sub-divide any of your habitat parcels or groups of parcels to reflect different condition and spatial factors. For example, you might find that an agricultural field is partly in one Agricultural Land Class category and partly in another. If this is the case, you could either simply choose to assign the whole field to the category that covers the greatest area, or you could split the field into two parcels (this is the most accurate option).

For all but the smallest projects, use of a Geographic Information System (GIS) will streamline calculation of habitat areas and (if necessary) enable parcels to be subdivided according to different condition or spatial indicators (see Section 6).

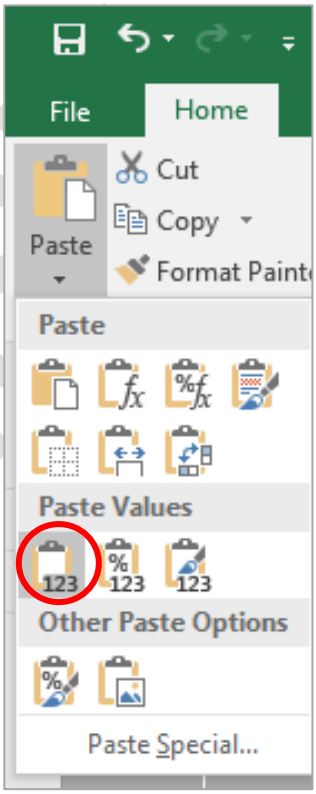
Sealed surfaces (e.g. roads and buildings) can always be aggregated (i.e. they can be entered on a single row) because they have a score of zero and will therefore not be affected by any condition or spatial factors. Gardens in a new housing development can also probably be aggregated into a single row as their condition is unlikely to vary unless they fall into different zones for indicators such as flood risk.

It is possible to paste habitat types and areas from the Biodiversity Metric into the EBN tool following the instructions in section 3.4. However, you may then need to subdivide the habitat types onto separate rows in the EBN tool data entry sheets, according to their values for the EBN tool condition and spatial indicators. Therefore, it could be easier to generate the EBN tool input data separately in a standalone process.

3.2 Data entry

Box 1: Important tips for data entry

When entering data, please note:



• If pasting from another source, always use ‘Paste Values’. Right click on the cell and choose ‘Paste Special’ or go to the Home tab of the menu, click on Paste in the top left of the menu bar, choose ‘Paste Special’. Then select the plain ‘123’ clipboard icon (not the one with a % sign or a paintbrush). This means that only the values will be pasted, not the formats, preserving the format of the cells.

• Do not try to ‘cut’ or ‘move’ cells as this may corrupt the tool functionality.

• You can autofill cells to copy the same value down a column (drag or double click the cross that appears when you hover over the lower right corner of the cell, see Figure 8, Section 4.2), but do not autofill horizontally across columns because this will change the dropdown selections.

• If auto-filling an indicator that ends in a number (e.g. population density), Excel may extrapolate the numerical trend (e.g. population density of 20-39 will become 20-40, 20-41, etc.). To avoid this, always select two consecutive identical cells in the column and then autofill (see Figure 8, Section 4.2).

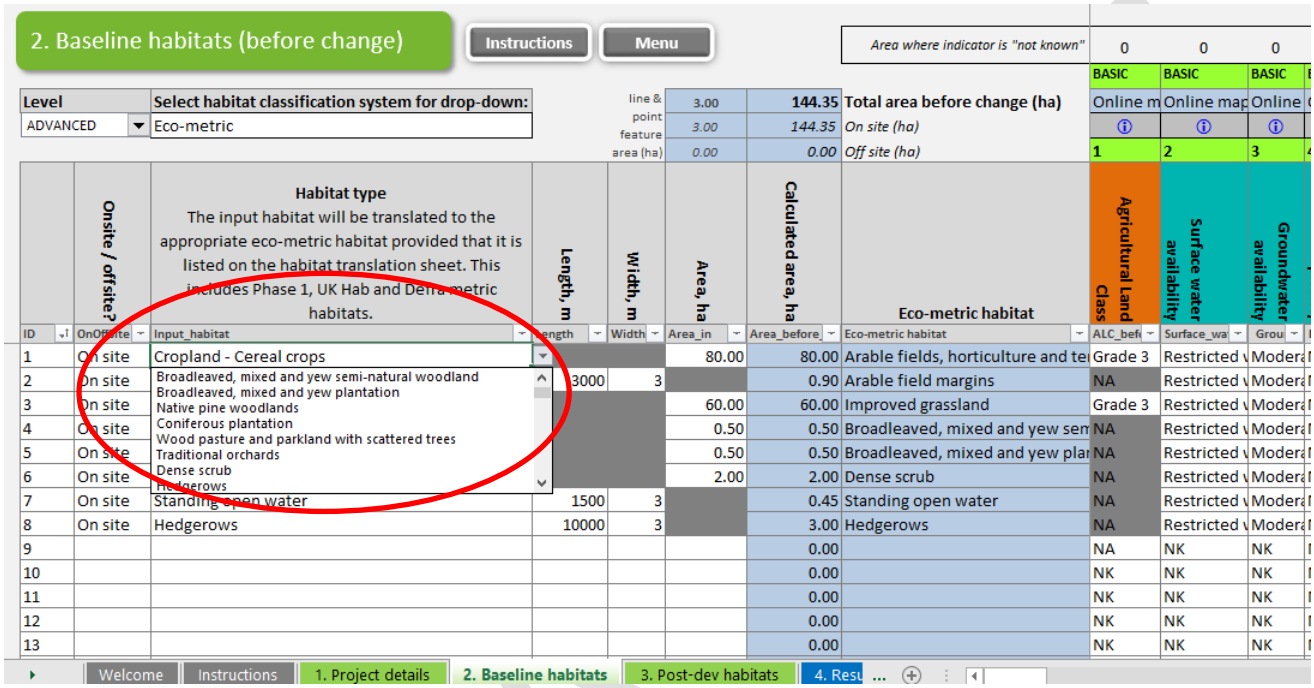
Start by entering habitats on the ‘2. Baseline habitats’ sheet. The white cells are for data entry.

Please note: the data entry sheets and many of the other sheets are set to ‘**Freeze panes’**, so that the left-hand columns and the top rows of labels are always visible as you scroll across and down the sheet. However, this can be turned off if desired by going to the View menu.

There is an **optional 'ID' column** where you can enter a code corresponding to specific habitat parcels, for your own reference. This is filled in as "1,2,3...." by default but can be changed by the user. It is not used in the calculations.

Enter **‘On site’ or ‘Off site’** in the next column. This enables on-site and off-site habitats to be displayed separately on Results sheet 4a. Note that offsetting losses of habitat with gains elsewhere can be on or off-site. If you leave this cell blank but enter a habitat type and area, it will be highlighted in red to remind you to select On site or Off site.

Figure 4. Baseline data entry sheet showing drop-down for habitat selection

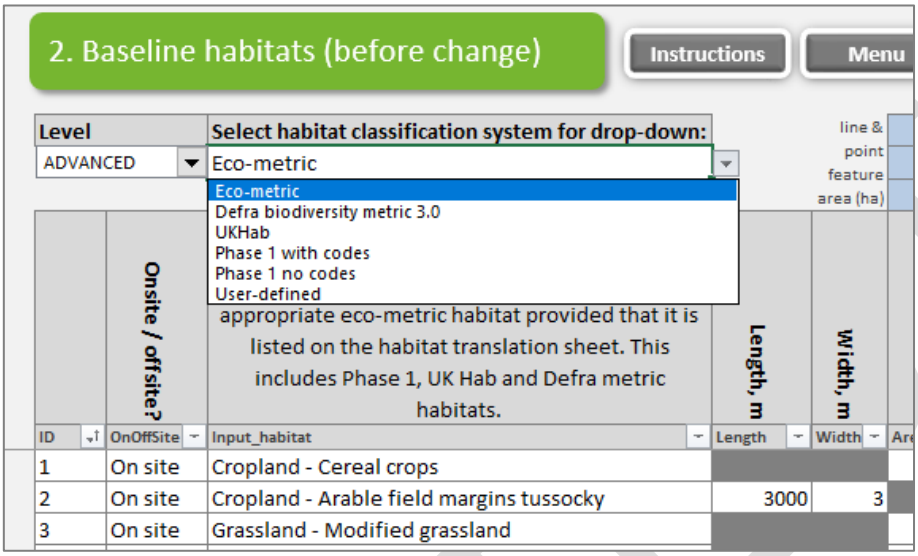


Enter the **type and area** of all baseline habitats, or the length and width for linear features (Section 3.3). For small areas with few habitat rows it is easiest to enter the habitat type by selecting a habitat from the dropdown box. Choose the habitat classification system you wish to use for data entry from the drop-down box at the top of the data entry sheets – you can use Phase 1, UKHab, Biodiversity metric habitats or the 'Eco-metric' habitats (named after the original name of the EBN tool). The definitions for this classification system will then appear in the dropdown boxes for each habitat type data entry cell. You can switch systems at any time to see a different list in the dropdown box - this will not affect the habitat types you have already entered. The habitat type that you enter will be automatically translated to match one of the 'Eco-metric' habitats used in the score matrix, which will be displayed in the blue cells to the right of the habitat areas (Column I).

For larger areas, habitat type and area data can be pasted in from another source such as the Biodiversity Metric (see Section 3.4) or a spreadsheet exported from GIS (see Section 6.1), but you must use '**Paste Values**' in order to preserve the formatting of the cell, including the availability of the dropdown habitat selection list (see Box 1). If pasting from another source, habitat type and habitat area must be pasted in separately as they are not in adjacent columns (they are separated by the habitat length and width columns to be used for linear features). Habitat names must exactly match one of the names used in the EBN tool (see Box 2).

However, it does not matter what habitat system is selected in the habitat classification dropdown box when you are pasting in habitat names.

Figure 5. Dropdown for selecting the habitat classification system



Box 2. Habitat name errors

If you enter an incorrect habitat name, by typing in directly (not recommended) or pasting from another source, you will see ‘Error - invalid habitat name’ and the translated habitat cell (column I) will be highlighted in red.

This is because there must be an exact match with the spelling and punctuation in one of the names used in the EBN tool habitat lists (for any of the classification systems used), including use of uppercase / lowercase, and any spaces. Sometimes a trailing or leading space can cause an error. To eliminate the error, you can simply select the appropriate habitat from the dropdown list in the cell.

If you enter an area but no habitat type, you will also see an error message ‘Error - no habitat selected’, and the translated habitat cell in column I will be highlighted in red.

Box 3: Customising the habitat selection list

You can create your own sub-set of habitats to appear in the habitat selection dropdown list, using only those relevant to you or putting those that you commonly use at the top of the list – just to make the list shorter and easier to use. This is done on the 'Habitat selection' sheet which you can reach from the Menu. However, you can only use habitats already defined in one of the other pre-defined lists on the Habitat selection sheet. Copy and paste habitats from the other lists to the ‘User–defined list’. 25 rows are available. If you do not use all these rows, there will be blank rows at the bottom of the drop-down list. Then choose ‘User-defined’ from

the habitat classification system selection drop-down on the data entry sheets. You can always switch back to one of the other classification systems to enter habitats not on your user-defined list.

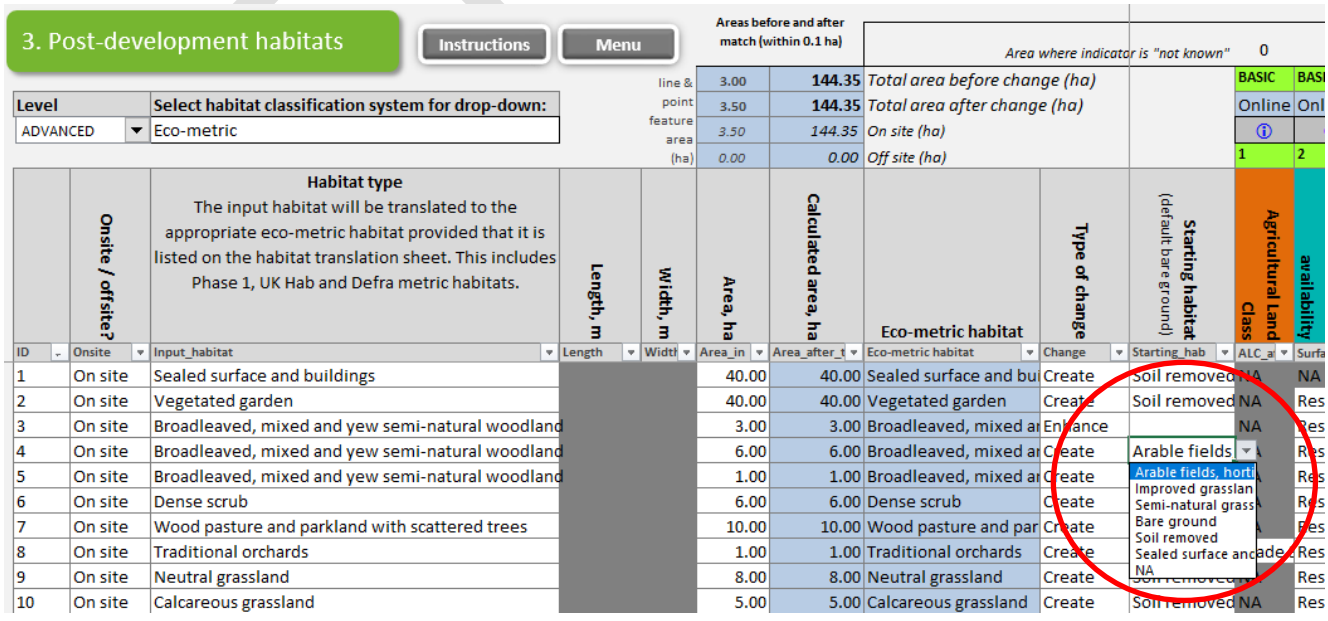
Enter the type and area of all habitats after the development or other land use change on the sheet named '3. Post-dev habitats' in the same way. On this sheet you must also fill in the **'Type of change'** column by selecting or entering:

- 'Create': for replacing a habitat with one of a different type
- 'Enhance': for changing the condition of a habitat but not the habitat type
- 'Retain': for unchanged habitats.

For all habitat rows where the habitat has been created, enter the **'starting habitat'** from the choice in the drop-down list. You can choose from a list: semi-natural grassland, improved grassland, arable, bare ground, sealed surfaces or 'topsoil removed' (for a typical housing development where all the soil is removed before construction). This is to enable the tool to take account of the initial starting condition when calculating the changes over time. For example, if you are planting woodland on improved grassland, the tool will assume that the carbon storage changes linearly from that of the grassland (3) to that of the woodland (10) over the 40 years that it takes for woodland to reach its target condition. This is a simplification, as changes will often not be linear and initial carbon losses due to soil disturbance are not included. However, it is more accurate than ignoring the starting habitat and assuming that all scores start from zero.

For newly created habitats, enter the target habitat on maturity. For example, enter 'semi-natural broadleaved woodland' if that is the target, even though the woodland will resemble a broadleaved plantation until it is established.

Figure 6. Post-development habitat data entry, showing dropdown for choosing 'starting habitat'



3.3 Linear and point features

Linear features (e.g. hedges, rivers, or footpaths) can be entered either as an area or as a length and width, whichever is most convenient. In fact, any habitat type could be entered either as a length and width or as an area, or with some parcels as each – this makes no difference to the calculations. The area will be automatically calculated from the length and width if both are entered; otherwise it will be copied from the area input column. If both length and width are entered, any value in the area column will be ignored – the cell will be greyed out to show this. Similarly, if a value is entered in the 'area' cell the length and width cells will be greyed out.

However, although the method of data entry makes no difference, certain habitat types (hedges, trees, green walls and green paths) are treated differently because the tool recognises them as 'line or point' features. The areas of these habitats are listed separately on the Results sheet. **For hedges and trees you should include the area of habitat beneath the feature** (e.g. the full area of the arable field right up to the boundary with the adjacent field, without subtracting the hedge area), **but not for rivers, streams and paths**. For green walls you should enter the area of the wall. **Please refer to the Data Catalogue** for detailed instructions.

For very short and narrow linear features such as a short section of hedge, the area may be less than 0.01 ha and will therefore appear as zero unless you choose to make use of the option of setting the tool to display additional decimal places for areas, lengths and widths (see Section 2).

3.4 Copying data from the Biodiversity Metric

As mentioned in Section 3.1, if the habitat parcels in the EBN tool need to be grouped or subdivided differently to those in the Biodiversity Metric, in order to take account of the EBN tool condition indicators, then it could be easier to generate the input data for each tool separately. However, if the habitat parcels or groups entered in the Biodiversity Metric each have the same EBN tool condition indicators, you can copy the input data across to the EBN tool following the instructions below and those in Section 3.2 above. Do not forget to always use 'Paste values' rather than 'Paste' (see Box 1) and remember that habitat names must match exactly (Box 2). Sometimes trailing or leading spaces have caused errors when copying habitat names from early versions of the Biodiversity Metric. If you find that habitat names in the two tools do not match, please report the issue to the email address provided on the Welcome sheet.

In the Biodiversity Metric the onsite and offsite habitats are entered on different datasheets. In the EBN tool, on-site and off-site habitats are entered together on the baseline and post-development sheets, with 'On site' or 'Off site' being selected in column C. Also, linear features (e.g. hedges and streams) are entered on the same sheet as other habitats in the EBN tool. If you are using the Biodiversity Metric 3.0, copy the habitat types and areas across from the following sheets to the Baseline habitats sheet. For hedges and rivers, you will need to convert the length from km to m and enter a width (e.g. 3m).

Table 1. Sheets to copy from the Biodiversity Metric 3.0 to the EBN tool Baseline habitats sheet

Biodiversity Metric 3.0 sheet	On site or Off site	Linear features
A-1 On-site Habitat Baseline	On site	
D-1 Off-site Habitat Baseline	Off site	
B-1 On-site Hedge Baseline	On site	Add hedge width
E-1 Off-Site Hedge Baseline	Off site	Add hedge width
C-1 On-site River Baseline	On site	Add river width
C-2 Off-site River Baseline	Off site	Add river width

Copy habitat areas and types from the following sheets to the Post-dev habitats sheet, again converting hedge lengths to metres and entering an assumed width. Enter 'Create' or 'Enhance' in the 'Type of Change' column on the Post-dev habitats sheet. Note that 'Enhance' can be used where an existing habitat is being upgraded to one of a higher distinctiveness but the same broad habitat type, e.g. upgrading existing woodland to priority habitat woodland.

Table 2. Sheets to copy from the Biodiversity Metric 3.0 to the EBN tool Post-dev habitats sheet

Biodiversity Metric 3.0 sheet	On site or Off site	Linear features	Type of change
A-2 Habitat Creation	On site		Create
A-3 Habitat Enhancement	On site		Enhance
D-2 Off-Site Habitat Creation	Off site		Create
D-3 Off-Site Habitat Enhancement	Off site		Enhance
B-2 On-site Hedge Creation	On site	Add hedge width	Create
B-3 On- site Hedge Enhancement	Off site	Add hedge width	Enhance
E-2 Off-Site Hedge Creation	Off site	Add hedge width	Create
E-3 Off- Site Hedge Enhancement	Off site	Add hedge width	Enhance
C-2 River Creation	On site	Add river width	Create
C-3 River Enhancement	On site	Add river width	Enhance
F-2 Off-site River Creation	Off site	Add river width	Create
F-3 Off-site Enhancement	Off site	Add river width	Enhance

Retained habitats

The Biodiversity Metric notes the area of any habitats that are retained unchanged on the baseline sheet (column S). In the EBN tool, enter retained habitats on both the Baseline habitats and the Post-dev habitats sheet. Enter the initial area on the Baseline habitats sheet and the retained area on the Post-dev habitats sheet and select 'Retain' in the 'Type of Change' column on the Post-dev habitats sheet.

4. Entering condition indicators and spatial factors

4.1 Basic, standard and advanced levels of assessment

There are 40 condition indicators or spatial factors. We have grouped them into Basic, Standard and Advanced level indicators (see Table 3). We suggest that small projects with limited biodiversity impact, or those at an early stage of development with limited data, can apply the Basic level of assessment (see Table 4). This draws mainly on freely available online datasets. Larger projects and those that affect semi-natural or priority habitats should apply the standard or advanced levels, which require additional data to be gathered via site surveys. Projects that want to focus on specific ecosystem services may wish to apply a mix of indicator levels, e.g. projects affecting rivers might want to apply advanced level indicators for rivers (fish barriers and water body naturalness) but a lower level of assessment for surrounding habitats.

Table 3. Suggested application of Basic, Standard and Advanced level indicators

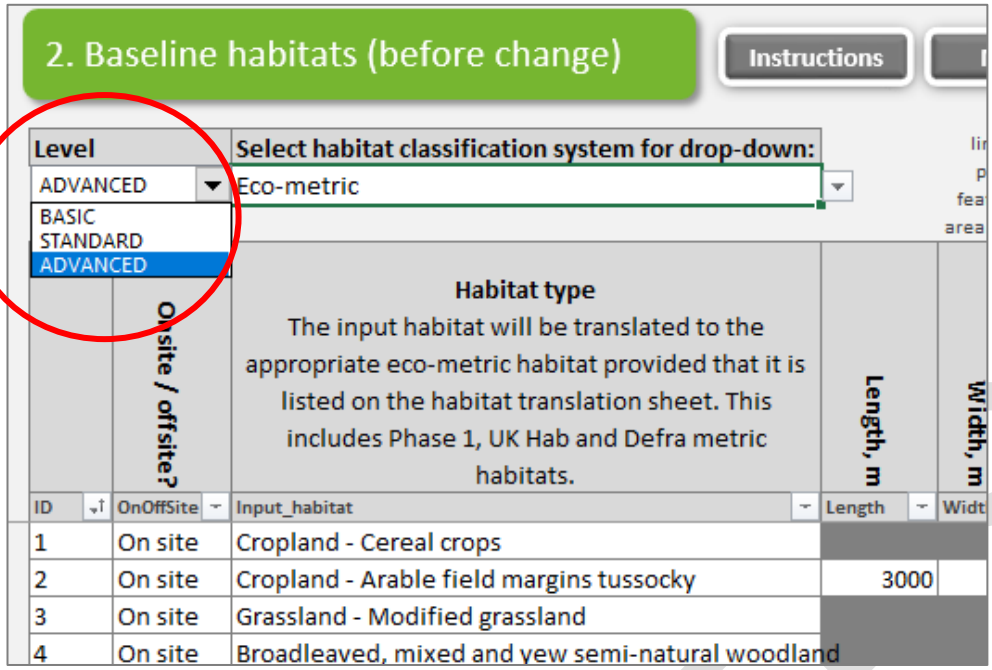
BASIC	**Generally, from freely available online maps and typically do not vary much, if at all, across the site.**
STANDARD	May require a site survey or collection of local information, or simple GIS analysis. May vary across the site.
ADVANCED	Typically require a site survey or complex GIS analysis and may vary for every habitat parcel.

Table 4. Relationship between project area and level of assessment

	Likely level of biodiversity and/or environmental impact		
Size of project	Low (no semi-natural habitats affected)	Medium (semi-natural habitats affected)	High (priority habitats affected)
Small (0.5 ha)	BASIC	BASIC	STANDARD
Medium (<500 homes)	BASIC	STANDARD	ADVANCED
Large	STANDARD	ADVANCED	ADVANCED

When you first go to the data entry sheets, they will only show the Basic indicators. If you want to reveal the Standard and Advanced indicators, use the dropdown list in the top left of the sheet. This will hide or unhide the appropriate indicator columns.

Figure 7. Dropdown list for selecting level of data entry (Basic, Standard or Advanced)



4.2 Entering the indicators

Fill in all the condition and spatial indicators on both the Baseline habitats and Post-dev habitats sheets. This can be done either by selecting the appropriate value from the dropdown boxes in each cell, or by pasting in values from another source **using 'paste values**' (see Box 1), provided that the data conforms to the list of valid entries for each indicator. Please **do not use 'cut' or try to drag the cells around**.

Instructions and links to data sources are provided on the 'Data sources' sheet and can be accessed via the ⓘ help links at the top of each indicator column. To return to the appropriate column of the data entry sheets, you can use the links in the final two columns of the data sources sheet. **More detailed information on each indicator can be found in the Data Catalogue**.

When entering the details of new habitats that will be created, for all indicators except tree size you should enter the target condition that will be achieved after 30 years (or 40 for woodland), not the initial condition when you first create the habitat. **For tree size, however, enter 'saplings' for creating a new woodland**. This is because the tool has a separate calculation that changes saplings (either from existing young woodland or created woodland) into 'poles' (the next size category) after 10 years.

Most of the indicators are specific to each row on the data entry sheets, i.e. they apply to a single habitat parcel or group of parcels with identical habitat types and conditions that are entered on a single row. The exceptions are:

- ‘Rainfall’ which applies to the whole site
- ‘Population density’ which applies to the local area
- ‘Landscape diversity’ which applies to the whole site.

Each dropdown box contains options for ‘not known’ (NK) or ‘not applicable’ (NA):

- **‘Not known’(NK)** means that you do not know the value of the indicator, so a default value will be used (usually this means a multiplier of 1). The percentage of ‘not known’ indicators is reported on the Results sheet as a ‘completeness’ score.
- ‘**Not applicable’ (NA)** means that an indicator does not apply to a specific habitat. For example, peat quality applies only to bogs. If an indicator does not apply to a specific habitat, the data entry cell will be automatically greyed out. A default multiplier of 1 will be used in the calculations for these cells, regardless of what you enter (i.e. they will be treated as if you have entered 'NA').

Do not leave values blank unless the area of the habitat is zero or the indicator is not applicable (greyed out) for that habitat. If you are unable to estimate a value choose 'Not known' (NK), and a default value will be used, as mentioned above. If you are not using some of the Standard level or Advanced level indicators set them all to 'NK' using autofill for the whole column (see below). By default, all indicators are set to “NK” initially.

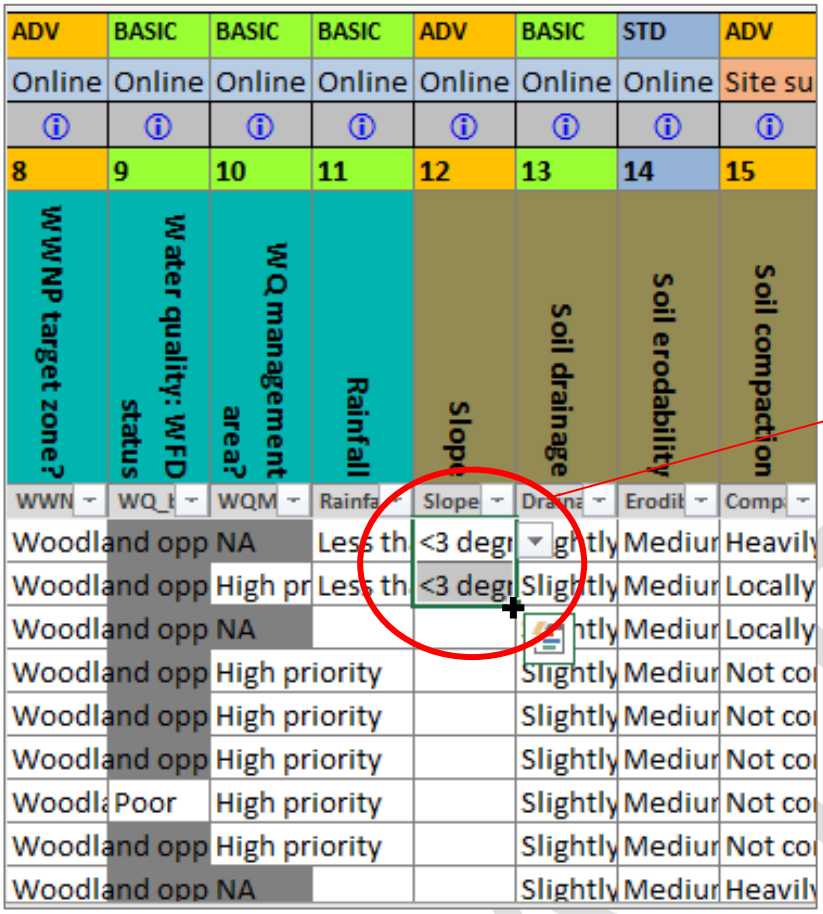
Auto-filling columns to save time

For many indicators the value will be the same for all habitat parcels (except those where the indicator is not applicable). You can autofill the whole column: fill in the top cell correctly, then hover over the bottom right corner of the top cell until you see a plus sign (see Figure), then drag it down to the end of your data.

Auto-filling tips:

- You can double click on the plus sign to fill the whole column. This might fill in all the rows to the bottom of the table (going past the end of your data), especially if all values are pre-filled with ‘NK’ (as in the ‘empty’ version of the tool that we supply). It is fine to leave these surplus values in place, but you can delete them if you want (click on the first cell then use Ctrl-Shift-Down arrow to select to the end of the column, and then press delete).
- If you are auto-filling numeric values or a string containing numeric values (such as ‘3 or more’), you may find that autofill increments the number by 1 on each subsequent row. To avoid this happening, fill in the first two rows and select them both before double clicking the plus sign in the bottom right corner of the cell in the second row.
- If there are some blank cells followed by an existing entry, the autofill will usually stop at the existing entry – and sometimes these existing entry cells look blank. Deleting all the values in the column before auto-filling will fix this. In any case, be sure to check that the autofill has gone right to the bottom of the rows you wish to change.

Figure 8. Auto-filling a column of indicator values



Hover over the bottom right corner and a plus sign will appear. Drag down to autofill further rows, or double click to autofill to bottom of data block.

For data containing a number, select the first two cells so the number does not increment on each row.

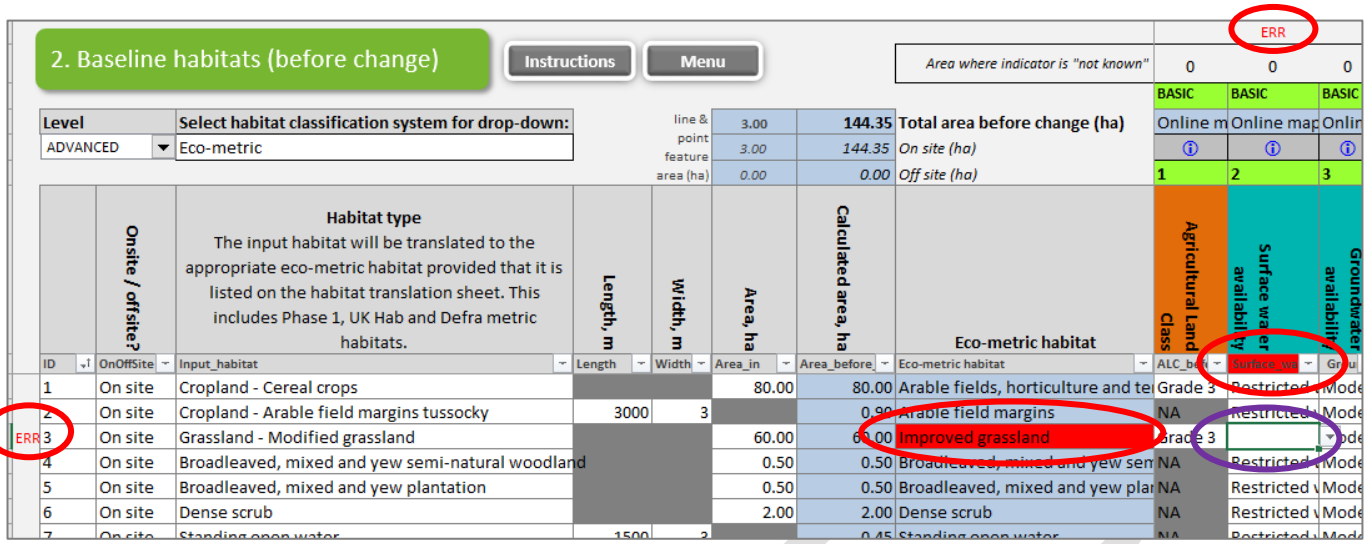
Do not autofill sideways (across columns) or the dropdowns will be wrong.

If the indicator is not applicable for any of the habitat types, it will be greyed out and it will be ignored in the calculation. You can set these cells to 'NA' if you wish, for transparency, but you can also just leave them blank or leave them auto filled to the same value as all the other cells.

4.3 Error checking

When all the indicators are filled in correctly, the results will appear on the Results sheet. If there are errors, symbols will be displayed instead of arrows in the Results table (see Figure 9) and the errors will be flagged using a red "ERR" in the first column to identify the row containing the error, and at the top of the column containing the error. The cell containing the habitat type and the indicator name will also turn red (Figure 9). Errors are also noted in the error checking section of the Results sheet, which will help you to identify the cause of the error.

Figure 9. Error checking system using red flags to identify the row and column containing the error (in this case a blank indicator cell shown by the purple ring)



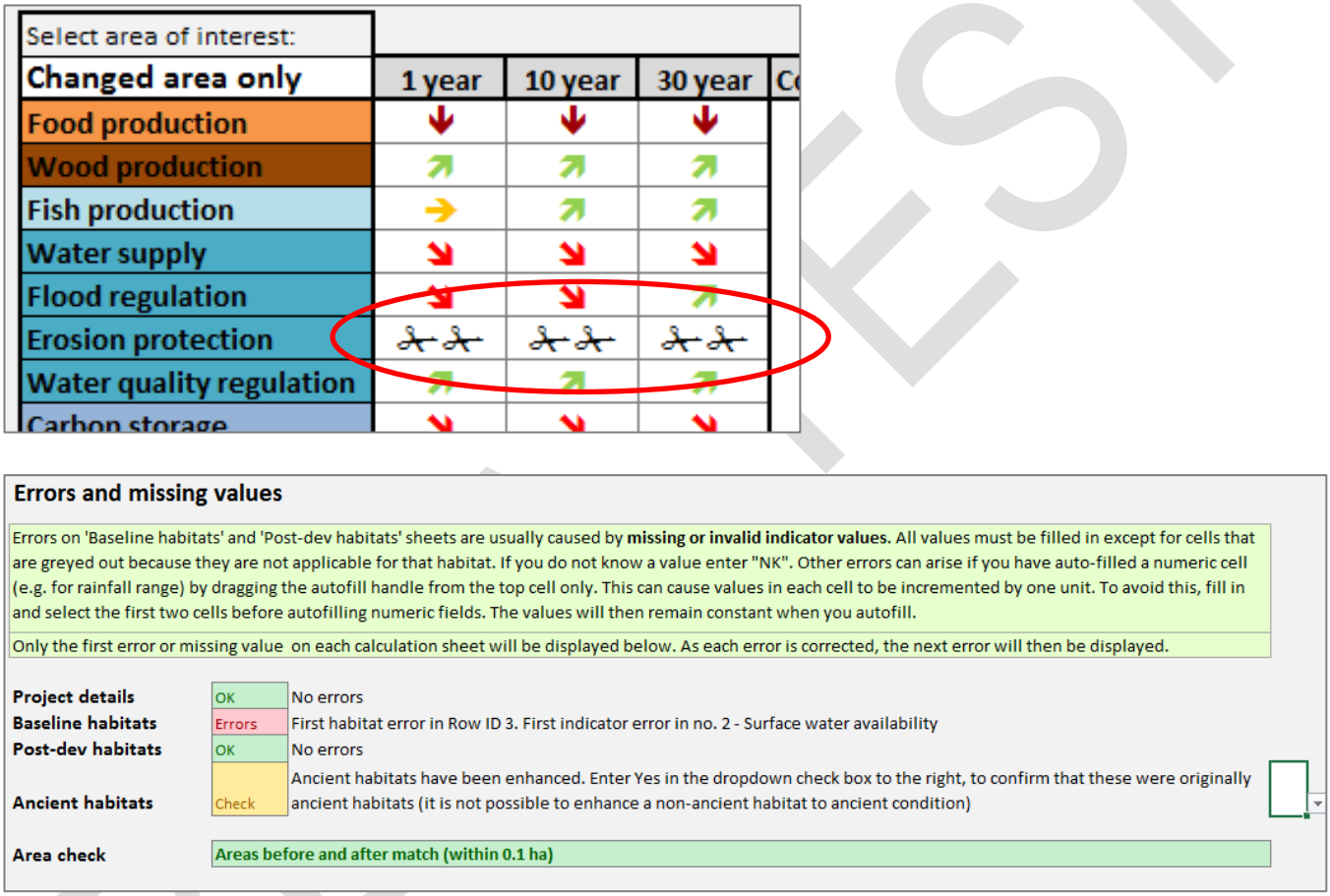
Errors are usually caused by missing or invalid indicator values on the 'Baseline habitats' and 'Post-dev habitats' sheets. The three main causes of errors are:

- **Missing values.** All values must be filled in except for cells that are greyed out because they are not applicable for that habitat. If you do not know a value enter "NK". Sometimes it is hard to see where the missing values are because the columns are quite narrow, and the previous column entry may obscure the missing entry. Use the error location section (below) to help track down the missing values.
- **Incrementing values in cells that include numbers.** If you have auto-filled a numeric cell (e.g. for rainfall range) by dragging the autofill handle from the top cell only, this can cause values in each cell to be incremented by one unit. To avoid this, fill in and select the first two cells before auto-filling numeric fields (see Figure , Section 4.2). The values will then remain constant when you autofill.
- **Pasting in indicators from an external source** that do not match the specified options in the dropdown box. This can sometimes happen if you are pasting in data from a previous version of the EBN tool but some of the indicator options have been changed. Go to the 'version control' sheet (via the Technical Menu) and check the Release Notes to see if something has changed. You can also simply try entering data directly via the dropdown to see if that fixes the error.

Sometimes the tool gets confused between text and numeric values, e.g. it looks as if you have entered the correct value for a numerical indicator but you are still getting an error because the tool is expecting either a text version or numerical version of the number and you provided the other format. We have tried to prevent this from happening by including both text and numeric versions in indicator lookup tables that include numbers. However you get this error and you are pasting from an external source you could try pre-formatting by copying your data to a new column using Excel functions such as T() to convert to text or Value() to convert to a number.

In the example in Figure 9, the user has blank or incorrect values in the ‘Rainfall’ column, starting in Row 6 of the Baseline habitats table. (Note that the error check on the Results page only identifies the first column where an error occurs and the first row where an error occurs. Once you have fixed those errors, the error check may find further errors further down or further across the sheet. So, it is easier to use the red flags on the data entry sheets to find and fix errors).

Figure 10. Error symbols appear on the results sheet instead of arrows if some indicators are missing or incorrect. The error checking flags on the data entry sheets (see above) will help you to find the errors. Errors are also shown on the Results sheet (lower part of this Figure).



Ancient habitat errors

Ancient habitats (e.g. ancient woodland, peatland or meadows) should be noted via the ‘Ancient’ condition indicator. The tool will check for the following errors connected to Ancient habitats.

- Users are not allowed to ‘create’ a new ancient habitat.
- Ancient habitats should be retained or enhanced. An error will be recorded on the Results sheet if this is not the case (i.e. there is a smaller area of ancient habitats in the post-development sheet than in the baseline).

- The tool cannot distinguish between genuine enhancement of an ancient habitat and a case where an ancient habitat has been lost and the user has tried to replace it by upgrading a non-ancient habitat to ‘ancient’, by changing the condition indicator and marking the habitat as ‘Enhance’. Therefore, if the tool detects that ancient habitats have been enhanced it will ask users to check a box to confirm that the enhanced habitats were ancient to start with.

5. Interpreting and using the results

5.1 Results sheets

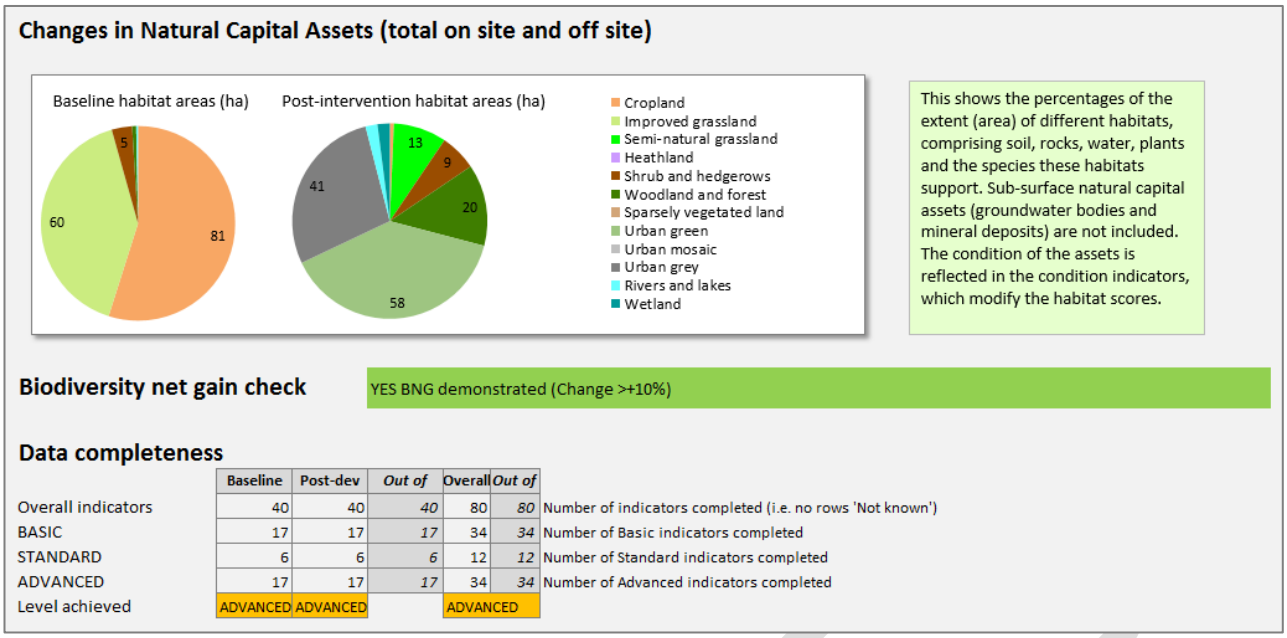
When you have entered all the habitat areas and condition factors, results are calculated automatically and will be displayed on the 'Results' sheet. This shows arrows indicating the direction and magnitude of change in the total score for each of the 18 ecosystem services at three points in time – 1, 10 and 30 years after the development or intervention, compared to the baseline before the development or intervention. The arrows do not take account of the cumulative impact up to that time.

Pie charts beneath this table show the natural capital asset extent, i.e. the habitat areas, for the baseline and post-development. There is also a check of whether biodiversity net gain has been demonstrated, based on the figures entered by the user on the Project Details sheet. This serves as a reminder that the EBN tool is intended to be used in conjunction with the Biodiversity Metric, and that biodiversity net gain is the primary driver.

Figure 11: Results sheet

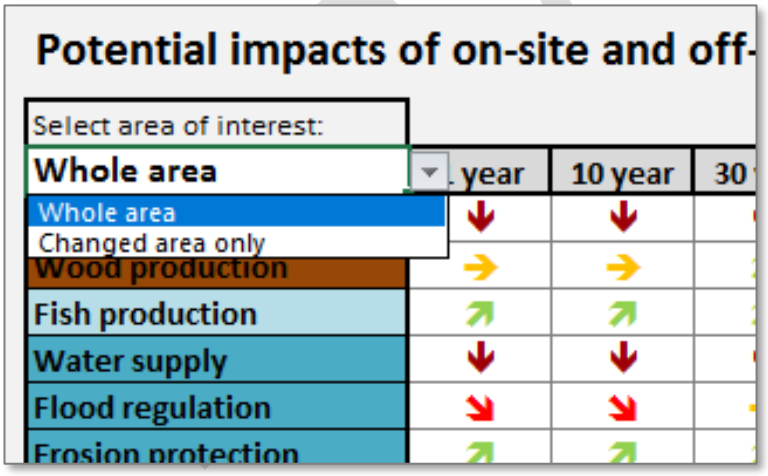
Potential impacts of on-site and off-site habitat change at three time points (not cumulative): Whole area

Select area of interest:						
Whole area	**1 year**	**10 year**	**30 year**	**Confidence**	**Interpretation**	Expand / Collapse
Food production	↓	↓	↓		The results 30 years after development indicate a large decrease in the potential for food production.	
Wood production	→	→	↗			
Fish production	→	→	→			
Water supply	↘	↘	↘		The results 30 years after development indicate a decrease in the ecosystem service of water supply. If	
Flood regulation	↘	↘	↗			
Erosion protection	→	↗	↗			
Water quality regulation	↗	↗	↗			
Carbon storage	↘	↘	→			
Air quality regulation	↘	→	↗			
Cooling and shading	↘	→	↗			
Noise reduction	↗	↗	↗			
Pollination	↘	↗	↗			
Pest control	↘	→	↗			
Recreation	↑	↑	↑			
Aesthetic value	↘	↗	↗			
Education	↗	↗	↗			
Interaction with nature	↗	↗	↗			
Sense of place	↘	→	↗			



There is a dropdown selection box in the top left corner of the results table which allows the user to view the results for the whole site (including and unchanged (retained) habitats) or only for the area where habitats are changed (Figure 12). This can be useful for cases where a relatively small amount of development on a much larger site can cause the changes to be 'diluted' so that the impact is hard to see. There is no right or wrong way of viewing the results, but the user should be aware of which option they are looking at.

Figure 12: Dropdown box on Results sheet for selecting whether to view the results per ha for the whole site or for only the habitats that have changed



Additional results sheets are available from the menu buttons, including:

- **4a. Compare on & off-site results:** arrows and natural capital asset pie charts for on-site and off-site habitats separately.

- **4b. Interpretation charts.** Charts showing the split of ecosystem service scores between habitat groups for each ecosystem service. These charts are useful for understanding the reasons for the changes in scores.
- **4c. Results breakdown tables.** Detailed result tables for each habitat type and service.
- **4d. Save scenario**. This allows users to compare the main results from up to three different runs of the tool side by side.
- **4e. Comparison with 100% suburban mosaic.** For housing developments only, this shows a comparison with what would have happened if the whole site was converted to a 'typical suburban mosaic'. This can be useful to illustrate the benefits of additional on-site green infrastructure.

5.2 How to check and interpret the results

The results show which services are estimated to have net gains and which have net losses. Where there are losses, the user can experiment with altering the type, condition, or spatial location of proposed habitats after the development or intervention to see if the score can be improved. You can make copies of the Excel spreadsheet to test different scenarios if you wish, but the 'Save scenario' option also allows rapid testing and comparison of up to three different options (see Appendix 2). Following proposed changes to the habitat types and conditions, the separate biodiversity metric calculation should be updated to check that the project still produces a biodiversity net gain.

The results will reveal synergies and trade-offs between different services. For example, planting new woodland on arable land could provide multiple benefits for carbon storage, aesthetic value, flood protection and air quality regulation, but there will be a loss in food provision. The EBN tool makes these synergies and trade-offs explicit, so that local stakeholders can consider their priorities and take decisions accordingly.

Users may wish to consider local priorities to determine which ecosystem services are most important for a given area. It is recommended that the EBN tool is applied as part of a participatory process, if possible, to ensure that priority setting is inclusive, consistent, transparent and thorough. Local stakeholders should be included, but national priorities such as food production or carbon storage should also be considered. Although it is unlikely that net gains in all services can be achieved, the EBN tool can be useful to make net gains and losses visible, to inform decisions. It could be applied as part of a process of Multi-Criteria Decision Analysis (MCDA).

When interpreting the results, it is very important to keep in mind the limitations of the EBN tool, as described in the Principles document. It is just one tool to support decision-making and should always be supported by any other available information. We have provided a button on the Results page to 'Link to other tools', which links to two good sources of information on additional tools that could be used to supplement the EBN assessment: ENCA and the EKN Tool Assessor.

The outputs should not be presented in isolation but should be used to develop a supporting narrative that explains the reasons for the changes in ecosystem service delivery in simple terms, to check that the outputs are logical and consistent with other assessments. Users should therefore perform a 'sense check' to ensure that the results make sense intuitively. You may wish to examine the interpretation charts and the underlying calculations to get a feel for the reasons behind the changes in EBN tool scores. To aid this, the Results sheet provides a link to a summary of the underlying calculations via the 'Calculations' button. If you want to see more detailed information, calculations for each habitat group or parcel can be seen on the 'Baseline score' and 'Post-dev score' sheets, accessible from the menu or from the Calculations sheet. On these sheets, the habitat parcels that are particularly valuable for delivering each service, in terms of the score per hectare including condition and spatial factors, are highlighted using a white-yellow-green colour scale (with more valuable habitats in darker shades of green). On the post-development scores sheet these are the scores per hectare that will be delivered *after* newly created post-development habitats have reached target condition.

The 'Breakdown tables', also accessed from the Results sheet, offer a breakdown of the scores for each type of habitat (grouped into either the Broad habitat categories used by Natural England or the habitat groups used by the Biodiversity Metric). Further down this sheet you can also see how the basic scores for each habitat type change after the condition and spatial multipliers are applied, and again after the multipliers for time to reach target condition and delivery risk are applied. This information is also presented for every individual habitat type, as well as the broad groups (you can filter out the un-used habitats for ease of viewing). This can help you to understand how the final scores depend on the habitat condition, spatial location and time and delivery factors.

Ratings have also been included to provide confidence using the results (Figure 13). These are displayed adjacent to results in the main dashboard. Ratings provided are set out below. These are each service-specific and will not alter according to the level of assessment used (e.g. Basic/Standard/Advanced).

Figure 13. Confidence ratings within the tool

	The relationship between the provision of the ecosystem service and habitats is complex. Evidence for scoring/multipliers is partial, although may be stronger for some habitats than others. Evidence gaps have been filled by consulting experts and with a degree of subjectivity, particularly for cultural services.
	We have some suitable evidence to calibrate our range of scores across habitats and multipliers and/ or scoring applied to a limited range of habitats/ multipliers for which there is a sound and simple rationale.

	We have a strong evidence base upon which to base scores across the range of habitats and multipliers used for this ecosystem service.

5.3 Printing the output

There are four main ways of printing the output.

1. Select File, Print to print directly from the page. The two main results sheets ('4. Results overview' and '4a. Onsite and Offsite results') have been formatted to print out in landscape format.
2. Export a pdf. From the two main results sheets ('4. Results overview' and '4a. On & Off-site') select File, Export, Create pdf/xps document, enter a filename, click on Options and make sure it is set to print the Active sheet, not the entire workbook, and click 'Publish'. This will create a two-page pdf of the main results overview sheet.
3. For a shortcut, the 'Print' button on the main results sheet will simply print the results using the default mode last selected by the user (which could be to pdf or to a printer).
4. From any sheet, take a snapshot of the screen using Shift-PrtSc (to copy the whole screen and crop later) or the Windows snipping tool (accessed by typing 'snipping tool' into the Windows Start menu, which allows you to select only the desired area). You can then paste this into any application (Word, Powerpoint, etc.).

6. Linking to spatial data

Input data for the EBN tool could be generated with a GIS (Geographic Information System) package such as ArcGIS or QGIS. Similarly, the output scores for each habitat parcel could be shown on maps in GIS.

The instructions below suggest how to import and export scores and data to and from ArcGIS. A few tips are provided for those less familiar with GIS. These instructions relate to ArcGIS, but similar steps should be possible in QGIS (which is free).

6.1 Importing habitat areas and indicators from GIS

Here we provide a suggested sequence of operations for importing data from GIS. Links to the required datasets are all provided in the Data Catalogue and on the Data Sources help sheet in the EBN tool (linked to via the ⓘ hyperlinks at the top of the data entry sheets).

1. Start from the baseline habitat file. This could be derived from OS MasterMap if you have a public sector, academic or other license, and/or Phase 1 habitat data, local site survey data or Natural England Priority Habitat data. Further guidance is available here. In the following steps you will progressively add attributes (columns) to this dataset to hold

information about any of the condition or spatial indicators that vary spatially across your site.

Tip: If you create a geodatabase to hold your habitat file and other output files, rather than working with it as a separate shapefile, you can use longer attribute names (not restricted to 10 characters) and the shape area will be automatically recalculated every time you create a new output dataset. Processing will probably also be faster.

2. Examine the Agricultural Land Class (ALC) in MAGIC.

    a. If the entire area falls within the same ALC grade, you can simply autofill the correct category in the EBN tool after uploading the data. But if you prefer to have everything in your shapefile, add a field for ALC and fill in the value (Grade 1, Grade 2 etc.) using 'Calculate field'.

Tip: When you create the ALC attribute, set all rows to "NA". Then select only the applicable habitat types (Arable, Improved grassland, Traditional and Intensive orchards) when you are entering the ALC grade. If any arable, improved grassland or orchard polygons do not have corresponding ALC information set them to "NK" (not known).

    b. Otherwise, if the ALC varies across the area but there is a simple way of matching it to sub-groups of the existing polygons, add an extra field for ALC, select each sub-group of polygons in turn and use 'Calculate Field' to set the required value (Grade 1, Grade 2, etc.)

    c. Otherwise if the relationship is spatially complex, download the ALC shapefile from data.gov.uk and intersect it with your habitat dataset using the 'Identity' function. Using 'Identity' instead of 'Intersect' means that you will not lose any parts of your habitat shapefile that are not covered by the dataset you are intersecting with.

Tip: To create a tidier output dataset, before doing the Identity operation you can go to Properties / Fields and turn off the display of any fields you do not need. Only the displayed fields will be exported to the new dataset. You can also set JoinAttributes to 'NO FID' in the Identity function to avoid creating extra FID attributes.

3. Repeat for the EA water resource availability shapefile. Download it from the link in the Data Catalogue or the EBN tool Data Sources sheet (see above)) and set the symbology to display the water availability categories for the Q95 attribute for your area (camscdsq95).

    a. If the entire area falls within the same Q95 category, you can simply autofill the correct category in the EBN tool after uploading the data. But if you prefer to have everything in your shapefile, add a field for surface water availability and fill in the value using 'Calculate field'.

b. Otherwise, if the water availability varies across the area but there is a simple way of matching the Q95 attribute to sub-groups of the existing polygons, add an extra field for surface water availability, select each sub-group of polygons in turn and use 'Calculate Field' to set the required value (Water available, Restricted water availability, etc.).

c. Otherwise if the relationship is spatially complex, intersect the habitat-ALC intersect with the water availability shapefile using Identity. Set your habitat map to be the Input dataset and the water resource shapefile to be the Identity dataset. Turn off the display of any attributes that are not needed before you do the Identity function (e.g. all except the camsdcsq95 attribute), so that you keep your output dataset tidy.

Tip: If you are working with a large, complex area with many habitat types you may wish to convert your polygons to a grid shape, by converting the habitat dataset and then each indicator dataset to raster (e.g. a 50m raster) and then back to polygon. See Step 5 below.

4. Work through the other indicators that are derived from online maps, following the steps above to determine whether you need to download the indicator dataset and intersect it with your habitat map. Although the user guide simply gives the link to the website where the maps can be viewed (e.g. MAGIC), many of the datasets are also available for download as shapefiles if you search data.gov.uk, or search the dataset name plus 'shapefile'.

5. To work out how many nature or cultural designations apply, if you are dealing with a large and complex area you can convert all the designation polygons to rasters and then add them up.

    a. Create a raster layer to use as your 'snap raster', to make sure all the rasters will line up neatly to the same grid. This layer needs to cover the whole area, so you could use your habitat basemap. Use Polygon_to_raster to do the conversion, setting the cell size to a suitable value (which will depend on the scale of the area, e.g. it could be 50m or 100m). Set 'cell assignment type' to 'Maximum combined area' – this will assign the cell value based on the predominant value by area within each pixel.

    b. The input rasters for the designated areas need to have a value of 1 for all pixels in the extent of the designated area, and zero or no data or no pixels outside this area. If necessary, create a new attribute with a value of 1 for all designated areas in the polygon dataset and use that as the value field when rasterising.

    c. Go to Environments / Processing extent. Set the processing extent to Union of Inputs and select the raster that you created in step a to be the Snap raster.

    d. Convert all the designation polygon datasets to rasters using Polygon_to_raster. For each one, choose a value field that will give a value of 1 for all areas in the

designation zone and zero or no data outside. Use the same cell size that you did for the snap raster.

e. Add up all the rasters using Cell Statistics with the overlay statistic set to SUM, ticking the 'Ignore NoData' checkbox. This should produce a raster layer with the value representing the number of overlapping designation layers.

f. Convert this back to polygon using Raster_to_polygon. Select the appropriate attribute to be the Value field and untick the Simplify Polygons checkbox and the Multipart features checkbox.

g. If you are using a pixelated grid version of the habitat layer, use Identity to merge this grid polygon with your habitat layer. Otherwise try using another method such as a Spatial Join instead, to preserve the shape of your polygons.

6. To determine public accessibility via footpaths, you can create a 50m buffer around a footpath dataset and then set accessibility within this zone to 'footpath access'. You could ask for a PROW (public rights of way) dataset from the local council, or you could download the Orval paths dataset from the University of Exeter or use Open Street Map paths. Clip the paths dataset to an area slightly larger than your area, use the Buffer function to add the 50m buffer, then use 'Identity' to intersect this layer with your habitat layer.

7. Similarly, if you are using the advanced level indicators that depend on habitat position (27 to 31, Air pollution barrier to Noise barrier), you can create a buffer around roads, watercourses or buildings (which can be extracted from OS open roads, OS open rivers or OS MasterMap), and intersect it with your habitat file.

8. When you have finished adding attributes to your habitat base map, make sure that the attributes match the EBN tool data entry categories. Set all non-applicable habitats for each indicator to 'NA' – for example, select only freshwater and saltmarsh habitats, invert the selection, and set the WFD overall status indicator to 'NA'. For the nature and cultural designations, select all rows with 3 or more designations and set to '3 or more'. You can do this in a new attribute or over-write the existing field.

9. You have a choice to either:

   a. Enter every row of this dataset separately in the EBN tool or

   b. Dissolve the dataset, setting all the fields you need as Dissolve fields, including the habitat type, ALC and all the other attributes you have merged in, and ticking 'Allow multipart features'. This means that you will merge any polygons that have exactly identical indicators so that they can be entered into a single row of the EBN tool data entry sheet. This means you will be dealing with fewer rows, but you will lose the distinction between different polygons (e.g. different fields or woodland patches) that have the same habitat type and condition.

10. If you are working with shapefiles rather than a geodatabase, create an attribute to hold the area of each polygon and populate it using 'Calculate geometry', choosing a suitable unit (e.g. hectares). If you are working with geodatabase features, the ShapeArea field is automatically calculated, though it will probably be in square metres (it depends on the units you are using in your map / GIS data frame).

11. If you are working with normal shaped polygons, and have not converted to a pixelated grid, check to see whether all your intersects have created lots of 'slivers' where polygon edges from different datasets are similar but do not quite match. To do this, open the attribute table for your dataset, choose 'Select by attributes' and select all the polygons with small shape areas, e.g. (depending on the scale of your project area) less than $100m^2$. Examine these – they are likely to be slivers along polygon edges, but if some of them are genuine shapes (e.g. small ponds) then de-select them or try a lower cut-off area. To get rid of any unwanted slivers, select the ones you want to get rid of and then use the Eliminate function, which will absorb them into one of the adjacent polygons.

12. Export your baseline habitat dataset to an Excel file (Geoprocessing, Search for tools, Table to Excel).

13. In this Excel file, you may need to add a column to calculate the area of each row in hectares rather than square metres, if it came from a geodatabase.

14. Create a dataset for the post-intervention / post-development habitats. This may require converting from CAD datasets. This can be fiddly and is best done using FME or a similar file converter package.

15. Intersect (Identity) the post-intervention map with the baseline map. This means you will have both the starting habitats and the post-development/intervention habitats in a single dataset, so that you can correctly set the 'starting habitat' for any created habitats. Also, you do not need to go through all the steps above separately for the post-intervention map, as all the information on ALC and the other indicators you merged in will be in this intersected dataset.

16. Some indicators such as ALC and water availability will be the same for post-development as for baseline, but others may have changed. For the changed indicators you can either change them in the GIS dataset, or in the exported spreadsheet, or after you have imported the habitat areas to the EBN tool, whichever is easiest.

17. As for the baseline map, you have a choice to either:

    a. Enter every row of this dataset separately in the EBN tool or

    b. Dissolve the dataset, setting all the fields you need as Dissolve fields, including both the baseline and post-development habitat types, the ALC and all the other attributes you want to keep, and ticking 'Allow multipart features'.

18. Again, if you are working with shapefiles rather than a geodatabase, create an attribute to hold the area of each polygon and populate it using ‘Calculate geometry’, choosing a suitable unit (e.g. hectares). If you are working with geodatabase features, the ShapeArea field is automatically calculated, though it will probably be in square metres.

19. As previously, check for slivers and eliminate if necessary.

20. Export this post-development dataset to an Excel file, as for the baseline habitats (Geoprocessing, Search for tools, Table to Excel).

21. As previously, you may need to add a column in your exported Excel worksheet to calculate the area of each row in hectares rather than square metres, if it came from a geodatabase.

22. You can now start entering data into the EBN tool data entry sheets. You might want to put a data filter on your exported habitat worksheet to get the habitats into a suitable order for entering into the tool (e.g. ordering by habitat type, ALC grade, etc.) – or you could just enter them as they are.

23. If you want to simplify your dataset further, you can create a pivot table in Excel and use this to amalgamate some of the categories if certain indicators are not relevant for some habitats. For example, the ALC grade is only relevant for arable, improved grassland and orchards, so if you want you could combine all the different ALC grades for other habitats such as woodland into a single row to be entered. However, you may find this is not worth the effort – it will make your data entry sheet shorter but will not affect the output of the tool, and it is a bit fiddly.

24. If your habitat names exactly match one of the permitted naming systems included in the EBN tool (Phase 1 with or without codes; UKHab; Biodiversity Metric 3.0 or Eco-metric habitats) you can simply select the entire column of your habitat names and use ‘Paste values’ to paste it into the EBN tool data entry sheet. Otherwise you may wish to either change them in your spreadsheet before copying to the EBN tool, either manually or by setting up a lookup table to translate into suitable input habitats, or you can paste in the incorrect names and then manually correct them in the tool using the drop-downs. If you have sorted by habitat type before entering the data then after you have corrected the first row for each habitat type you can simply autofill the rest by dragging the plus sign that appears when you hover over the bottom right hand corner of the cell.

25. You can then select the column of polygon areas from your spreadsheet and use ‘paste values’ to paste them into the Area column in the EBN tool. Obviously keep the spreadsheet in the same order as it was when you copied and pasted the habitat types – do not sort or filter before copying the areas.

26. If the attribute values in all the other columns are in the right format, they can also be pasted in using ‘paste values’. Otherwise, correct them in your spreadsheet before pasting into the EBN tool. If your spreadsheet has one column for each of the 40 EBN

tool indicators, and they are in the right order, you can copy and paste the whole block of indicators in one go. Otherwise you can do them individually.

27. For the post-development data entry, repeat this process using the ‘before and after’ spreadsheet that you created, and pasting in the ‘after‘ habitat types.

28. For newly created habitats, set the ‘Type of change’ cells to ‘Create’, and paste in the column of starting habitats from your exported spreadsheet.

6.2 Exporting the scores to GIS

A facility for exporting the ENB tool scores for each habitat row to a spreadsheet and then to GIS has not yet been set up.

6.3 Applying the basic scores only (not condition factors) to a GIS habitat map

1. Go to the ‘Scores’ sheet. Type ‘matrix’ into the range box (top left of screen) and hit return. This should select the named range containing the score matrix. Copy this matrix and paste into a new Excel workbook, with no blank rows or columns at the top or to the left (i.e. paste the range into cell A1 of the new workbook).

2. Immediately below the matrix, in the first column, add a list of all the habitat types used in your GIS map. For example, if you are using Phase 1 classifications in your GIS map, you need to list exactly the same classification labels, spelt exactly the same way. One way to derive this list is to export your habitat map to an excel file (Geoprocessing, Search for tools, Table to Excel), and then apply a pivot table to the excel habitat list to see what habitats are listed.

3. Match your habitat types to the equivalent scores in the matrix, using the ‘Habitat translation’ sheet, and copy those rows of scores to your habitat list. Do not copy any rows where the same habitat type is listed in the EBN tool matrix, i.e. the habitat name matches.

4. Change the column headers so they all have a max of 10 characters.

5. Import your extended matrix into GIS using the ExcelToTable tool (Geoprocessing, Search for tools, Excel to Table),.

6. Join the table to the habitat shapefile.

7. You can now use the new joined columns to change the symbology.

7. Copying data to a new version of the tool

It is easy to copy the data from one version of the tool to an upgraded version, or from the Short version to the Long version if you need more rows, or to a clean version of the tool if the input data formats have been corrupted (if the guidance in Box 1 was not followed). The key is to use 'Paste Values'. The data can then be copied over in four blocks. It should take only a few minutes.

1. Copy the information from the Project Details sheet to the new version,
2. On the Baseline habitats sheet, select the block of data including the On-site – Off-site column, the habitats and the lengths, widths, and areas.

Tip: Copy the whole block of data using short-cut keys (useful if there are many rows). Click in the first cell of the block (C9). Press Ctrl-Shift-Down-arrow, which should select the column as far as the last row of your data. Then press Ctrl-Shift-Right-arrow which should select the whole block of data up to the area column. If your data has gaps where indicators or rows are blank, simply keep pressing the arrow (with Ctrl-Shift still held down) until the whole block is selected. Then press Ctrl-Insert to copy to the clipboard**.**

3. Go to the new version of the spreadsheet, click on cell C9, go to the Paste icon in the Home menu bar and select 'Paste Values' (see Box 1).
4. Go back to your original version, and select the whole block of indicator data, from ALC (column J) to the last indicator and, if needed, the Comments column.

Tip: The short cut to the bottom row of the first indicator column (ALC) described in the Tip box above will not work here because all indicator columns are pre-filled with 'NK' by default, so Ctrl-Shift-Down arrow will take you right to the bottom of the table. If you don't have many rows you can select all the rows of data in column J manually. If you have hundreds of rows you can start from the bottom of the block and select upwards instead. Use Ctrl-Shift-Down arrow to get to the bottom of the Habitat list (column D), then use right arrow (without Ctrl or Shift) to go across to the bottom of the first indicator column (ALC), then Ctrl-Shift-Up arrow to select to the top of the column. This will select the header row of the table (row 8) as well, so to come down one row to cell J9 use Shift-down arrow. Then use Ctrl-Shift-right arrow to select to the last indicator column and, if needed, the comments column. If your data has gaps where indicators or rows are blank, simply keep pressing the arrow (with Ctrl-Shift still held down) until the whole block is selected. Then Ctrl-Insert to copy to the clipboard.

5. Go to the new version of the EBN tool, click on the first row of the first indicator (ALC) and use Paste Values (as for step 3).
6. Repeat for the Post-development habitats, but this time you will need to copy the 'Change' and 'Starting habitat' columns as well as all the indicators. So, click on the first row of the 'Change' column first before you select and copy the rest of the block with Ctrl-Shift-Down arrow, Ctrl-Shift-Right arrow, Ctrl-Insert.

7. Check for errors on the data entry and Results sheets. In some upgrades, there may have been changes to the options available in the drop-down boxes for the indicators. If this is the case, you may need to replace some of your data with new values that match the available options. This will be described in the Release Notes on the Version Control sheet and in the email notifying you of the upgrade. If the whole column has the same value, you can simply change the top value and then auto-fill the column. Otherwise it is probably easiest to select the whole column and then use 'Find/replace' to update each value in turn.

For some upgrades, it may be necessary to change some of the input data – for example if some of the category names for the indicators have changed. An 'Upgrade' spreadsheet has been developed to help users upgrade to the most recent version. Users simply paste their input indicator values onto the 'Input' sheet and then copy and paste the upgraded values (with updated category names) from the 'Upgrade' sheet.

Appendix 1: Structure of the tool

The EBN tool is an EXCEL workbook consisting of the following worksheets.

Worksheets needed by the user

- **Welcome**: introduction to the tool; what it does and does not do.
- **Instructions:** quick start instructions
- **1. Project details**: space for users to enter basic project details (see section 2).
- **2. Baseline habitats**: data entry sheet for habitat area and condition indicators before development or intervention, both on site and for any compensatory habitat creation or enhancement off site
- **3. Post-dev habitats:** data entry sheet for habitat area and condition indicators after the development or intervention and the associated biodiversity net gain (retained, created, or enhanced habitats) both on site and off site
- **4. Results**: Arrows showing direction and magnitude of change for each ecosystem service at 1, 10 and 30 years after development, and pie charts of natural capital assets (habitat extent)
- **4a. Compare on & off-site results:** arrows and natural capital asset pie charts for on-site and off-site habitats separately.
- **4b. Interpretation charts.** Charts showing the split of ecosystem service scores between habitat groups for each ecosystem service. These charts are useful for understanding the reasons for the changes in scores.
- **4c. Results breakdown tables.** Detailed result tables for each habitat type and service.
- **4d. Save scenarios.** Save the main results table for up to three different scenarios so that you can compare them side by side.
- **4e. Comparison with 100% suburban mosaic.** For housing developments only – shows a comparison with what would have happened if the whole site was converted to a 'typical suburban mosaic'. This can be useful to illustrate the benefits of on-site green infrastructure.
- **Data sources**: summary table with information on each condition or spatial indicator, including links to the appropriate data sources. Accessed directly or via the info links on the data entry sheets.

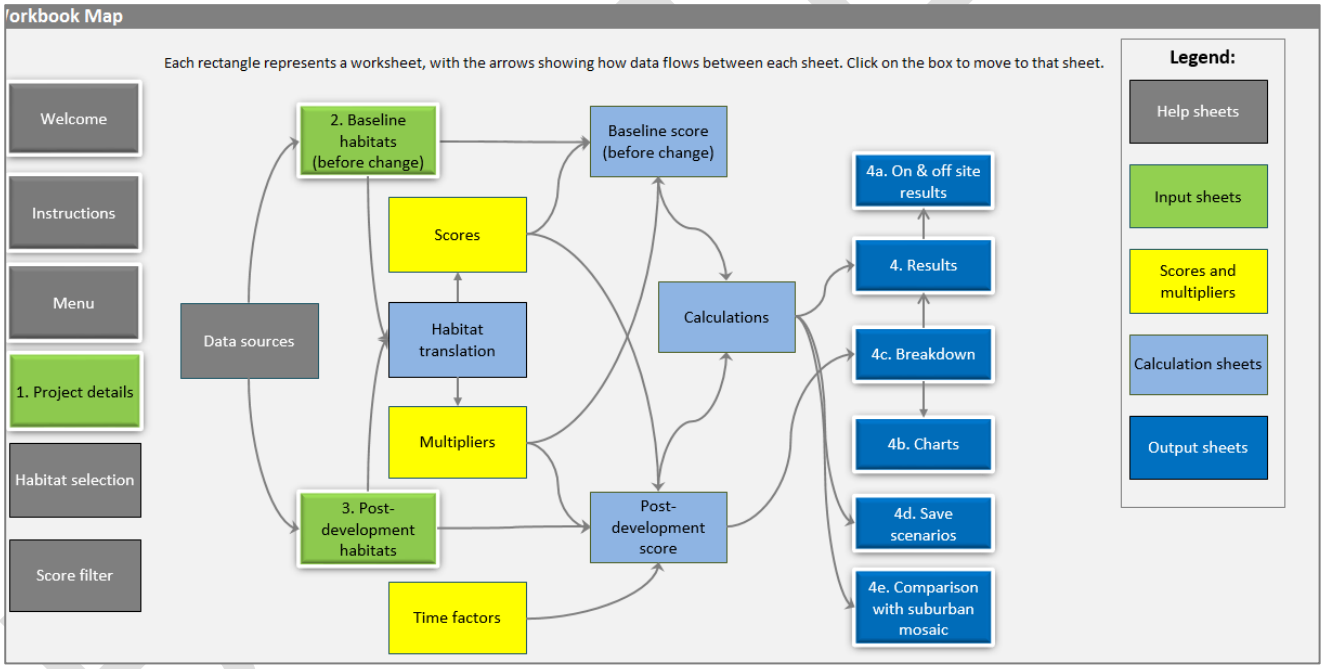
Worksheets used internally by the tool (the user does not need to access these unless interested).

- **Baseline scores:** calculation sheet where the EBN tool units for the habitats before the development or intervention are calculated.
- **Post-dev scores:** calculation sheet where the EBN tool units for the habitats after the development or intervention to deliver biodiversity net gain are calculated.
- **Calculations:** summary calculations which underlie the arrows on the results sheets.
- **Map**: a map showing how the different worksheets are connected (see 3).

- **Scores**: the matrix of habitat scores.
- **Score filter**: a sortable version of the score matrix if users want to see the top habitats for different ecosystem services.
- **Multipliers**: tables of condition and spatial multipliers.
- **Time factors**: table of multipliers to correct for 'time to reach target condition'
- **Applicability**: used to determine which condition and spatial indicators apply to each habitat type.
- **Habitat selection**: source of the dropdown lists of habitat types used for data entry. The user can define their own list on this sheet if desired.
- **Habitat translation**: used to automatically translate different habitat classification systems into the appropriate EBN tool habitat.
- **Version control:** list of updates including release notes where applicable.

The sheets are colour coded as shown in Figure 1. There are only three data entry sheets, identified with green tabs. The user enters input data on these three sheets, and the results are calculated automatically and displayed on the results sheets.

Figure 14: Map of the EBN tool workbook (this is in the workbook)

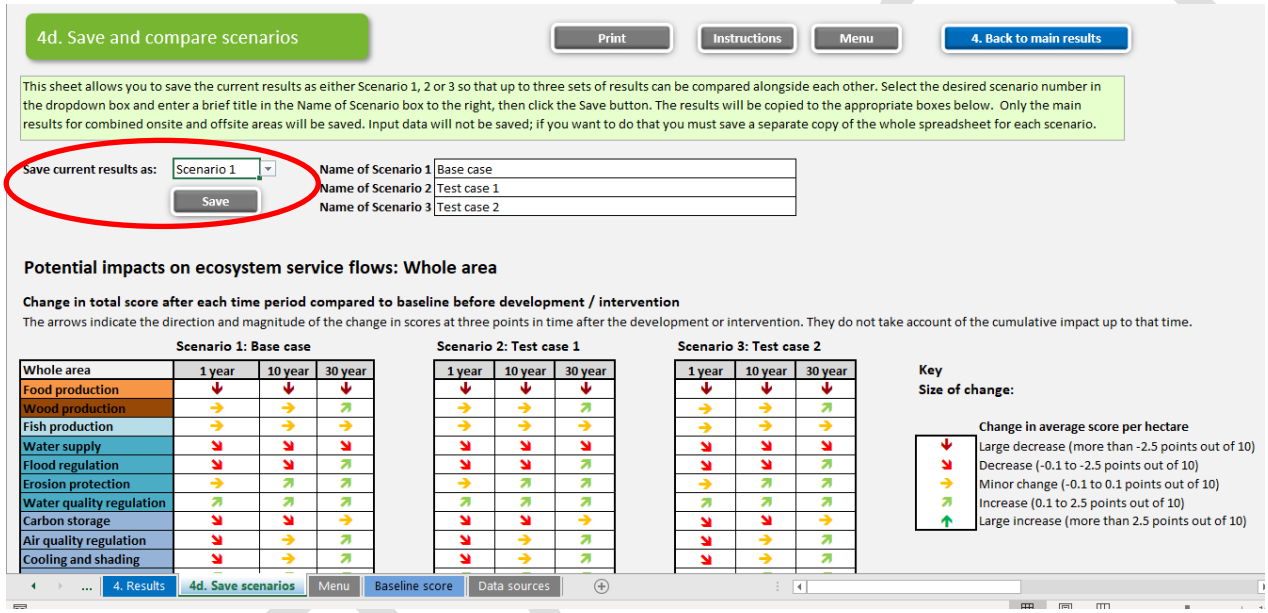


Appendix 2: Saving scenarios

To compare scenarios within the tool first record your ‘base case’ against which you wish to compare results. This should be Scenario 1.

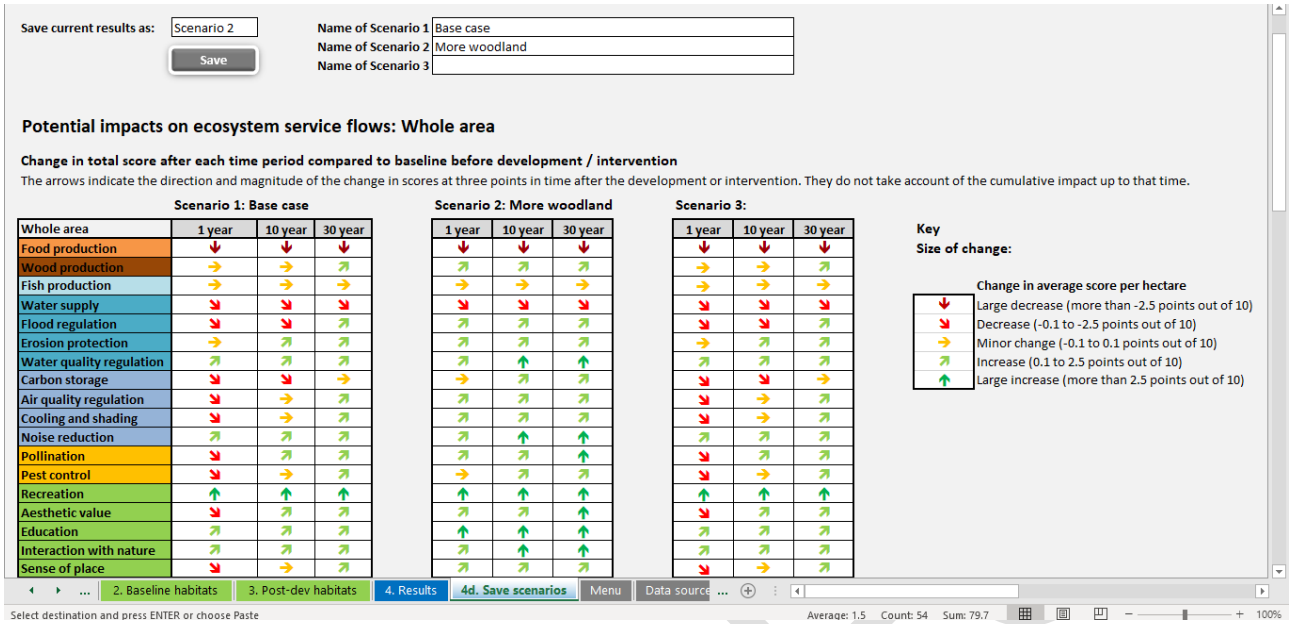
This can be done by running the results, in accordance with instructions above and clicking on the 4d Save Scenario button on the Results tab. This will take you to the screen set out below. Toggle the dropdown box left to Scenario 1 and click on the save button below. The name of the scenario can be changed using the box provided and appears above the left chart

Figure 15. Save Scenario Screenshot



To compare it to a second scenario, make the necessary changes to the baseline habitats or post development plans (for example retaining more of the original habitat, increasing the area of post development habitat, or changing its type for example from grassland to woodland). The results should be re-calculated automatically. The above process then needs to be repeated, this time selecting scenario 2 from the drop down. The charts will then automatically change upon clicking on the save button allowing you to easily compare impact against your original plans (as can be seen in Figure 16).

Figure 16. Example showing impact of significant increase in post-development woodland saved in Scenario 2



A third scenario can be entered in the same way.

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