

The Biodiversity Metric 4.0 and Small Sites Metric - QGIS template and GIS import tool

User Guide

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Defra Group



March 2023

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1. Introduction

1.1. Purpose of this guidance

- 1.1.1. This guidance provides instructions on how to use the QGIS template and GIS import tool ('the import tool'), which can be used to input mapped data into Biodiversity Metric 4.0 (hereafter referred to as 'the main metric') and the Small Sites Metric (hereafter referred to as 'the SSM').
- 1.1.2. This guidance is not relevant for previous releases of the QGIS template and import tool associated with previous metric releases.

1.2. What are the QGIS template and GIS import tools?

- 1.2.1. The QGIS template is a QGIS project where the habitats at baseline and post-intervention can be mapped for a site.
- 1.2.2. The GIS import tool is a Microsoft Excel tool which imports files created in the QGIS template and exports this data to the main metric or SSM by filling in relevant metric sheets.
- 1.2.3. This process means that data can be mapped and input directly into the main metric and SSM, thereby increasing efficiency and providing a standardised methodology so that spatial data is recorded in a format suitable for the requirements of these metrics.

1.3. Competency requirements

- 1.3.1. This QGIS template guidance is aimed at practitioners with an existing working knowledge of QGIS software. Skills required for using the template include creating and editing spatial data, layer edits, and working with attribute tables.
- 1.3.2. The import tool can be utilised with a basic level of competence in Microsoft Excel.
- 1.3.3. When using the QGIS template or import tool to inform a main metric or SSM calculation, this must be done so alongside, and in strict accordance with, the main metric and SSM guidance associated with this release of the QGIS template and import tool.

1.4. Alternative GIS software and workflows

- 1.4.1. QGIS software has been chosen as it is freely available, and it is recommended that this software, and the methodology below are used. However, the import tool uses Comma Separated Values (CSV) files produced by other GIS software or manually, although they need to be in the same format.
- 1.4.2. Where other GIS software or workflows are used, a 'GIS Data Standard' is available, to assist with producing compatible data.

1.5. Limitations of this guidance

- 1.5.1. This guidance relates to use of the QGIS template and import tool associated with version 4.0 of the main metric and associated version of the SSM only, and does not aim to instruct on broader use of QGIS or Microsoft Excel. As such, complimentary techniques such as adding basemaps or setting up composer manager outputs are not detailed in this guidance.

1.6. Limitations of the tools

- 1.6.1. The QGIS template was developed in QGIS version 3.10 (the latest long-term release available at the time). Compatibility issues may arise if working with other versions of QGIS.
- 1.6.2. Where feasible, variables or inputs within the QGIS template have been restricted to pre-defined responses. This does not replace the need for expertise in selecting appropriate responses and users should ensure they are familiar with associated main metric and SSM guidance to assist in making appropriate assessments and setting feasible targets.

1.7. Using the QGIS template and import tool with the SSM

- 1.7.1. When mapping in the QGIS template, there are restrictions in the SSM (see SSM User Guide) which need to be considered:
 - the SSM has strict site area restrictions, so polygons cannot add up to more than this
 - the SSM only accounts for on-site data
 - the SSM only contains habitats of medium distinctiveness or lower
 - the SSM only allows particular defaulted condition categories for each habitat (align with SSM tab 11)

- only particular habitat interventions are possible in the SSM – such as restrictions on the habitat type and condition that a baseline habitat can be enhanced to
- ‘Location ecologically desirable but not in local strategy’ is not an option for Strategic Significance in the SSM
- a maximum of 20 rows of data can be input into the SSM, therefore only 20 polygons can be mapped in the QGIS template, otherwise they will be lost in the SSM

1.7.2. If options required for a project are not available in the SSM, then the main metric should be used.

2. QGIS template

2.1. Template structure

- 2.1.1. The QGIS template contains separate groups of layers for area habitats, hedgerows and watercourses, which reflect the three habitat categories ('modules') as defined in the main metric and SSM. The template also contains a group of layers for the broad habitat type 'individual trees' which are also available in the metric.
- 2.1.2. Each of these layer groups comprise 'Baseline', 'Proposed' and 'Master' vector layers, where habitats can be mapped. Each of these contain standard drop-down lists providing options for habitat type and associated variables. See the 'GIS Data Standard' for the full list of variables and response options.
- 2.1.3. The Baseline, Proposed and Master Layers for each habitat module are linked, so that when data is input into one of these and saved, the same data will be filled in within relevant sections of the associated layers.
- 2.1.4. The template contains 'Graphics' layers which should not be edited but provide additional symbology options for representing the data.
- 2.1.5. The template also contains a 'Red Line Boundary' layer where the site boundary can be mapped, and a 'Basemaps' layer, where basemaps for a site can be input.

2.2. Area habitats

- 2.2.1. Area habitats like grassland and woodland can be mapped in the 'Habitats' layers as polygons. For area habitats specifically, baseline and proposed habitat data needs to be filled in.
- 2.2.2. All area habitats are treated the same when mapping except for green walls. As green walls are vertical, these cannot be mapped within the template, therefore need to be input manually into the main metric or SSM.

2.3. Hedgerow and watercourse habitats

- 2.3.1. Hedgerows and watercourses are mapped in the relevant layers as polylines.

- 2.3.2. There is an additional option to map wide watercourses using the 'watercourse footprint' category in the 'Habitat' layers. Where this category is used, the watercourse must also be recorded as a polyline in the Watercourse layer to capture key information.
- 2.3.3. Watercourse data can also be mapped in the 'Enhanced by realignment' – 'Realigned Proposed Habitat' layer for illustrative purposes only. See details on this below.

2.4. Individual trees

- 2.4.1. Individual trees can be mapped as point data on top of area habitats, for illustrative purposes only. They cannot be imported into the GIS import tool or exported to the main metric or SSM, so will need to be manually filled into these tools.

2.5. Mapping habitat data

- 2.5.1. On-site and off-site data need to be mapped in separate QGIS template projects.
- 2.5.2. Prior to creating features within the QGIS template, first import any necessary raster and vector layers required. This could include satellite imagery, detailed maps, and site plans.

Baseline data

- 2.5.3. It is recommended that users input data in two phases: first enter the baseline data, and second enter the proposed habitat data.
- 2.5.4. Users can input data to either the relevant Baseline or Master layers. Linked layers for a habitat module will update regardless of which is edited, however the stylings and the editable variables differ between layers.
- 2.5.5. Baseline data can be entered in one of three ways, as detailed below:

Option 1: Mapping individual habitats

- 2.5.6. Habitat features can be mapped individually by creating a new polygon or polyline in the relevant layer. This methodology is best-suited for hedgerows and watercourses, although it can be applied to area habitats. However, there is a greater chance of discrepancies between total site area and the sum of the area habitat areas using this method depending on user competence.

- 2.5.7. Each time the user creates a new feature, a dialogue box appears with several editable variables, comprising mostly drop-down lists of standard options (Figure 2-1).

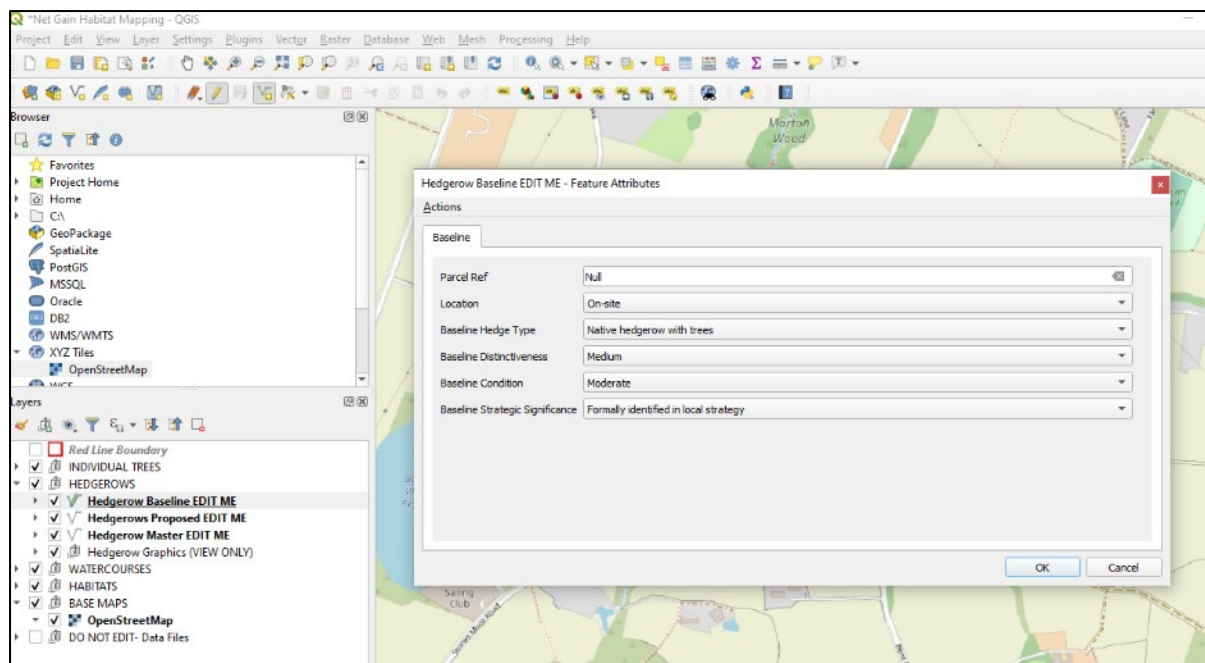


Figure 2-1 Example of a dialogue box when creating a new feature

- 2.5.8. Users can complete as many or as few of the variables as required at this stage, and can later fill in missing data within the attribute table.
- 2.5.9. Users should note that some variables are dependent on others, for example broad habitat type must be entered prior to the specific habitat type, for the habitat options to appear.

Option 2: Creating a site area and splitting it

- 2.5.10. An alternative method which is suited to area habitat data entry is to create a polygon representing the site boundary in the 'Red Line Boundary' layer, copying it into the relevant Habitats layer and splitting this into specific habitats.
- 2.5.11. The site area in the Habitats layer can be split using the range of cutting tools available with QGIS. Adjusting the layer transparency settings may assist in this process, allowing the user to trace features from relevant basemaps.

2.5.12. This approach is useful in avoiding potential issues that can arise from creating features individually, such as misaligned or overlapping vertices. Once the areas have been split, values for each feature can be filled in within the attributes table (Figure 2-2).

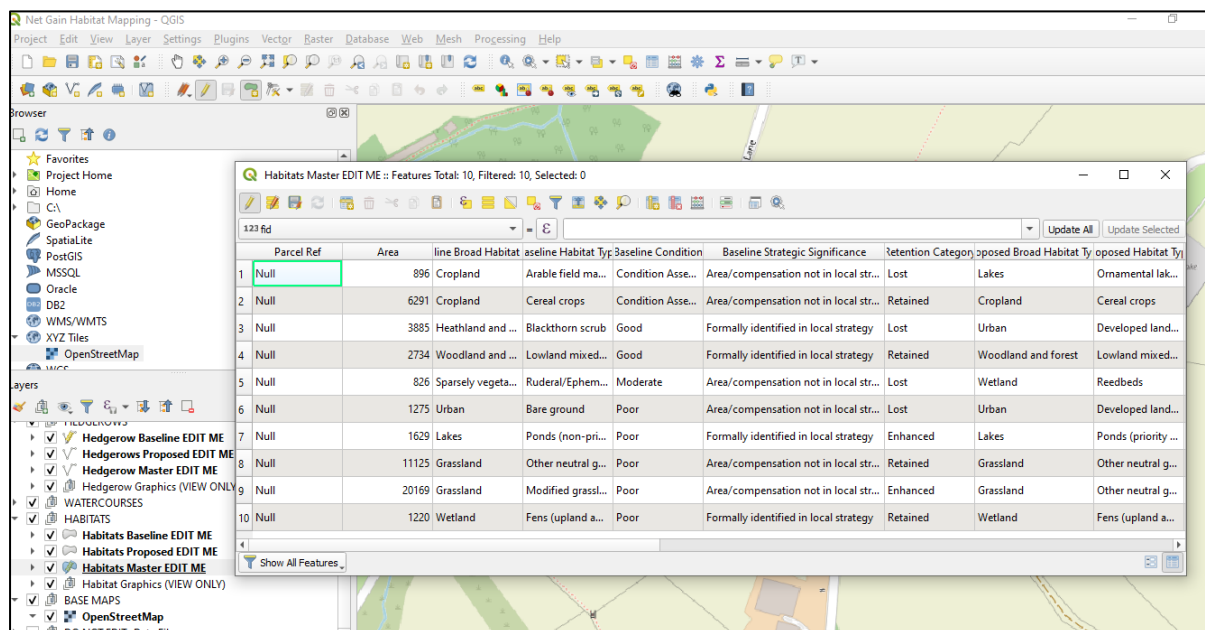


Figure 2-2 Example of the editable attributes table

Option 3: Import from existing layers

2.5.13. If habitats have already been created in QGIS but independently from the template (for example using the intersection tool), then the blank geometry can be copied and pasted into the relevant Baseline or Master layer. Values for each feature can then be applied within the attributes table.

Editing notes

2.5.14. Users should avoid re-shaping polygons as this will alter baseline areas. Instead, use the various cutting tools in QGIS to divide features.

2.5.15. To aid in workflow efficiency, input variables have been restricted or automated where feasible. For this functionality to work, users need to input variables in a systematic manner, working through the variables in the order given. If altering a feature, users should ensure they adjust all variables for impacted features to avoid creating incorrect value combinations.

- 2.5.16. Users should be aware that due to QGIS limitations, some linked automated fields only visually update when the attribute table is re-opened. However, the underlying data file updates as soon as the edits have been saved, so this restriction does not impact the accuracy of data exports. Additionally, this limitation does not apply to the area and length fields which update automatically whenever a feature is edited.
- 2.5.17. Whenever moving between editable layers within a group (i.e., from the Baseline to Master layer), users should click the refresh button (hotkey: F5) to ensure all layers have synced.
- 2.5.18. The 'Parcel Ref' variable in the attributes table is a useful way to link a habitat parcel (individual feature) to the main metric, SSM, and a report (Figure 2-3). Values can be manually set by the user or can be automatically generated by leaving this variable blank until the end of the data creation process. Once all the required features have been created, the attributes table formula bar can be utilised to match the values in this variable to those of the hidden 'fid' variable (the 'fid' variable is automatically populated with unique values).

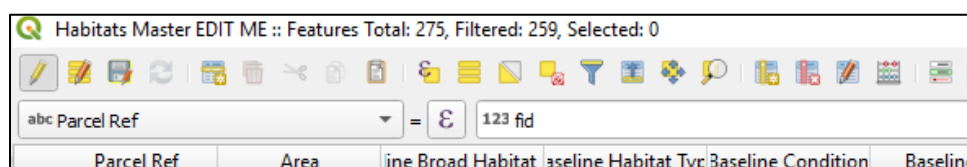


Figure 2-3 'Parcel Ref' in the attributes table

Baseline backup

- 2.5.19. It is strongly advised to create a copy of the entire QGIS folder once the baseline data entry has been completed. This back-up copy can be duplicated and used for mapping subsequent design revisions.

Proposed data

- 2.5.20. Once the baseline data entry has been completed, users can enter the values for the proposed habitats on the site. This is most easily done in the required Master layers, but can also be done in the Proposed layers.
- 2.5.21. The methodology for entering proposed data varies slightly between area habitats, compared with hedgerows and watercourses. For area habitats, all features should have the baseline data already completed, but for hedgerows and watercourses, newly created features may lack baseline values, and these should be retrospectively completed – in most cases this

will be the 'To be created' option at Baseline, with other values filled in as 'N/A'.

- 2.5.22. When viewing the proposed layer, styling is set to reflect the proposed values, which for hedgerows and watercourses without baseline values, will show as 'To be created' where this option has been selected.
- 2.5.23. Existing baseline features can be subdivided utilising the QGIS edit functions so that the geometry of individual features reflect proposed habitats. Proposed values should then be entered into the attributes table for the subdivided features.
- 2.5.24. Users should avoid using any multi-edit functions due to risk of the overwriting the whole range of variables as some drop-down menus will stack.

Assessment details

- 2.5.25. To support traceability, additional assessment detail fields have been included within the layers and attributes table, allowing the site name, survey date, survey details, comments, name of the mapper and company to be entered.

Graphics styling

- 2.5.26. In addition to the baseline and proposed layers, there is a graphics sub-folder in each habitat category with several style layers. Users can utilise these layers to quickly produce their own graphical outputs to assist in data interpretations.
- 2.5.27. These additional style layers are linked to the data entry layers, and do not require any additional inputs. They will automatically update each time layer edits to the data input layers are saved.
- 2.5.28. The available graphics layers include habitat condition, distinctiveness and retention category. When splitting a polygon to create habitat features, the distinctiveness of habitats may need filling retrospectively in the attributes table where they do not automatically generate.
- 2.5.29. It is advised that the styles in the project are not changed as they align with the latest metric habitat names and options.

Watercourse 'enhancement by re-alignment'

- 2.5.30. A unique workflow exists for when watercourses are 'enhanced by realignment'. Users should familiarise themselves with the Watercourse section of the Biodiversity Metric 4.0 User Guide before using this workflow.
- 2.5.31. When watercourses are enhanced by realignment, the geometry of the baseline and proposed features will differ, and users can map the baseline watercourse, and proposed realigned watercourse, which may be longer or shaped differently to the baseline watercourse (Figure 2-4).
- 2.5.32. Data is stored in the Master layer as normal, however additional Graphics layers are provided in a subfolder to illustrate changes.
- 2.5.33. The folder labelled 'Enhancement by Realignment (Graphics Layers)' contains three additional layers which can be used to map the proposed realignment. Users can either copy existing polylines to be enhanced from the 'Watercourse Master' layer and paste them into the 'Realigned Proposed Habitat' layer before modifying vertices, or manually create a new polyline.
- 2.5.34. Variables in the 'Realigned Proposed Habitat' layer are restricted to proposed options and an additional 'Baseline Parcel Ref'. This should be completed to match the parcel ref for the baseline polyline.
- 2.5.35. The Realigned Proposed Habitat layer is linked to the other two layers in this folder; 'Realigned Proposed Condition' and 'Realigned Proposed Distinctiveness'. Users are only required to enter data in the Realigned Proposed Habitat layer and all three layers will be populated. Each layer is individually styled to reflect the proposed habitat type, condition and distinctiveness respectively.
- 2.5.36. The Realigned Proposed Habitat layer is for illustration only, and the new proposed realigned length will not automatically fill out when exporting to the main metric and SSM, therefore this will need to be manually filled out in the 'Length Enhanced' column of the chosen metric, using the value in the attributes table in the 'enhanced by realignment' column.

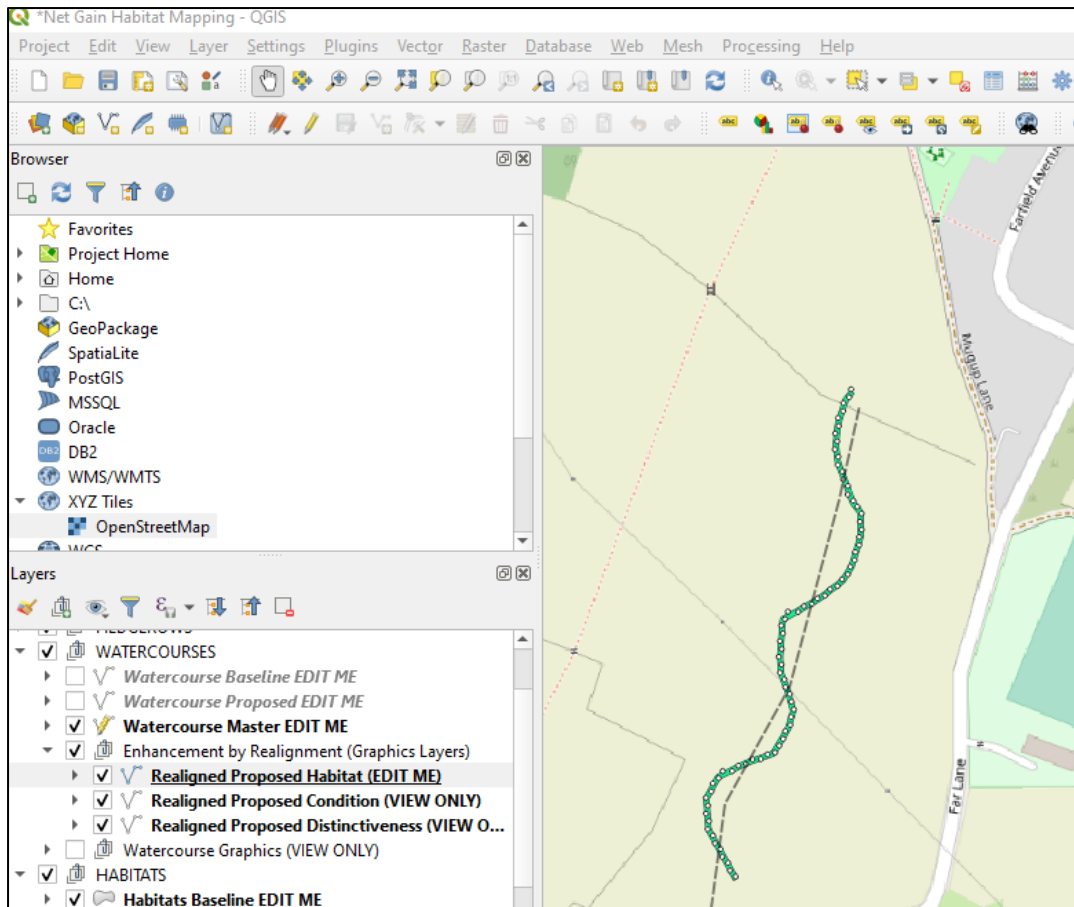


Figure 2-4 Example of a mapped watercourse that has been ‘enhanced by realignment’

How to export data for the GIS import tool

- 2.5.37. Once the data entry for all habitats has been completed, the values for each module (habitats, hedgerows and watercourses) can be exported as a CSV file, as a separate file for each module.
- 2.5.38. This can be done by selecting the relevant Master layer and performing a ‘Save As’ through the Layer drop down menu, or by right clicking the relevant layer and selecting ‘Export’ / ‘Save Features As’ (Figure 2-5).
- 2.5.39. Exported data files must be named in a specific way to be recognised by the import tool. Each file must contain one of the unique identifiers as follows: Habitats ‘hab’, hedges ‘hed’, and watercourses ‘riv’. Suggested file name structures would include the habitat type and a version number:
- Habitats v1.1
 - Rivers v1.1
 - Hedgerows v1.1

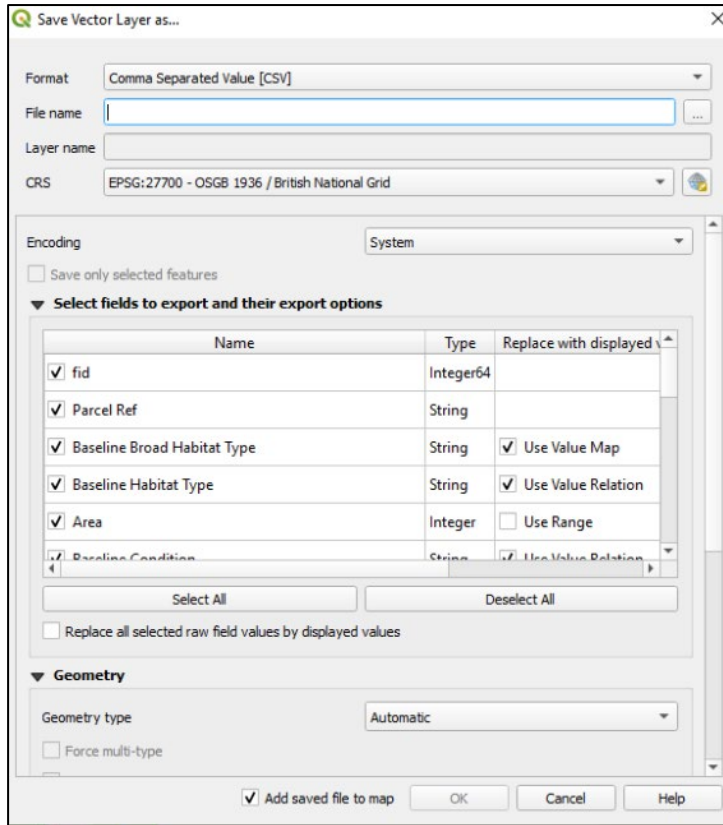


Figure 2-5 The dialogue box that appears when you save a layer as a CSV

3.2. Consolidating data

- 3.2.1. Whilst all features will represent different geospatial values, data can be grouped by habitat type where required.
- 3.2.2. By selecting the 'Consolidate Data' button, the data is reordered and grouped by habitat type, and listed in the relevant 'Consolidated Data' tab. Non-consolidated data also then populates the 'Non-Consolidated Data' tab.
- 3.2.3. If the user wishes to track individual polygons with an audit trail through to the metric it is advised not to use the consolidation functionality because they may be merged with other polygons of the same attributes within the same dataset.
- 3.2.4. Limitations in the import tool mean that the consolidate function might not work where long habitat names are used with other variables with long names – examples of habitats where this might be an issue are: 'Artificial hard structures with integrated greening of grey infrastructure (IGGI)' and 'other rivers and streams', among others. In this instance, the user should export the data from the non-consolidated tab to the metric. If this does not work, manually enter the data for the habitat where this is an issue.

3.3. Error checks

- 3.3.1. At the top of each tab, there is a table which runs cross-checks on the areas present within each retention category accounted for within the CSV data. These provide a rapid assessment of whether there have been any issues with the data import or consolidation process.
- 3.3.2. Where an error is identified, the relevant 'error check' cell will be highlighted red (Figure 3-2). It should be noted that there are potentially some scenarios where non-matching areas are acceptable.

K	L	M
Areas	ha	Error Check
Total	1.7792	Data Matches
Created	0.9315	Data Matches
Retained	0.2587	ERROR - Data mismatch
Enhanced	0.5890	Data Matches
Lost	0.9315	Data Matches

Figure 3-2 The error check box at the top of the import tool

3.4. Exporting data to the main metric

- 3.4.1. Before exporting data into the main metric, click the 'On Site' or 'Off Site' button at the top the tab that will be exported to choose the required option. This will change whether the required on-site or off-site tabs are filled in within the main metric.
- 3.4.2. Either the consolidated or non-consolidated data can be exported from the required tab, by selecting the 'Export' button in the top right of the sheet. This will trigger a dialogue box instructing the user to select the required main metric .XLSM file.
- 3.4.3. The main metric file selected to export to must include 'metric' in the file name to be recognised by the import tool.
- 3.4.4. When the data has loaded, a dialogue box will inform the user that the data has been exported. Click 'OK' and the main metric will be displayed, populated with the imported data.
- 3.4.5. Repeat the process for all the required habitat, hedgerow and watercourse data as needed.
- 3.4.6. Following import to the main metric or SSM, modifications can either be made within QGIS and then re-imported, or they can be tested within the metric to indicate potential adjustments that could be made to proposals.
- 3.4.7. When exporting data from the import tool, export data will override any existing data, so users may wish to make multiple versions of the workbook to sequentially track changes made.

3.5. Exporting data to the SSM

- 3.5.1. The process for exporting to the SSM is similar to the main metric except for the differences outlined below.
- 3.5.2. The SSM can accommodate 20 rows of data, therefore users should ensure that 20 polygons or less are imported, otherwise the extra rows will be lost when this data is exported to the SSM. Where more data is needed, the user should consider using the main metric.
- 3.5.3. To export data from the import tool to the SSM, the 'On Site' button in the top right of the page must be selected, as there is no off-site data permitted in the SSM.

3.5.4. For the SSM, select the 'SSM Export' button at the top right of either the consolidated or non-consolidated tabs as required. This will trigger a dialogue box instructing the user to select the required SSM .XLSM file.

3.5.5. Follow the steps outlined for the main metric as required.

3.6. Apple Mac users

3.6.1. Where issues are encountered while running the import tool on Apple systems, the advice below may offer a solution:

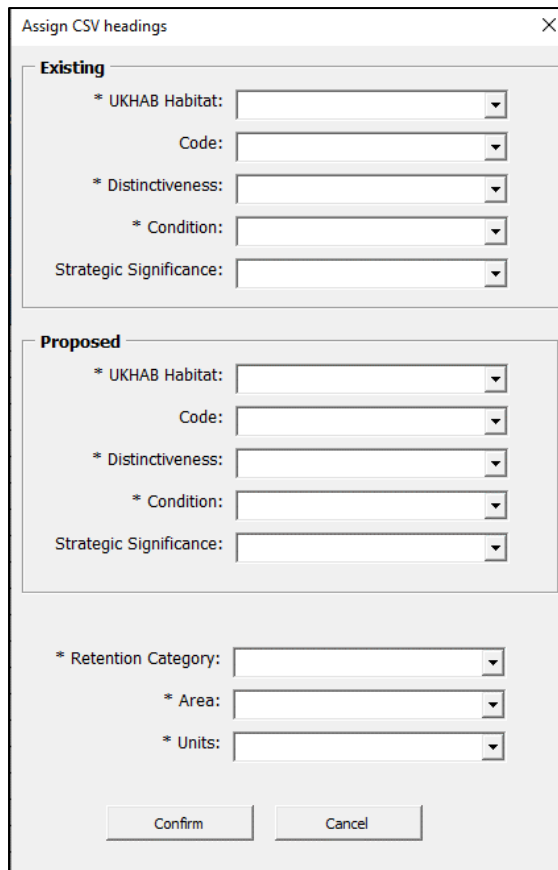
- before importing CSV files to the import tool, open the target CSV file and close any other CSV files
- before exporting to the main metric or SSM, open the desired metric file and close any other files

4. Data from alternative sources

- 4.1.1. The import tool has been designed to facilitate the import of CSV data from sources other than the QGIS template.
- 4.1.2. When using data that has not been created in the QGIS template, the CSV file needs to be standardised in a specific manner to achieve compatibility with the import tool and successfully export to the main metric or SSM.
- 4.1.3. The data standard provided in 'GIS Data Standard' (separate Microsoft Excel file) details the required variables and possible response options for each habitat module – habitats, hedgerows and watercourses, as well as an example CSV to show the required structure of the data.
- 4.1.4. As with the QGIS output, a separate CSV file for each habitat type and on-site and off-site data is required. CSV files must be named in accordance with the guidance above.
- 4.1.5. If using alternative software packages, it is important that the rules set out within the main metric or SSM guidance are adhered to when completing mapping. If these rules are not adhered to a wide range of errors may be introduced into the metric. The import tool does not provide a compatibility or quality check on any data that it is provided with.

4.2. Importing data from alternative sources

- 4.2.1. When importing data that has not been created in the QGIS template, the same steps outlined above can be followed. The user can follow the same initial steps as above.
- 4.2.2. When the relevant CSV file has been imported according to the instructions above, the user will be presented with a table to define which headers apply to each listed variable (Figure 4-1). These can be selected from the drop-down menus. Those marked with an asterisk are compulsory.



The image shows a dialog box titled "Assign CSV headings" with a close button (X) in the top right corner. The dialog is divided into three main sections. The first section, labeled "Existing", contains four rows of dropdown menus: "* UKHAB Habitat:", "Code:", "* Distinctiveness:", and "* Condition:". The second section, labeled "Proposed", also contains four rows of dropdown menus: "* UKHAB Habitat:", "Code:", "* Distinctiveness:", and "* Condition:". The third section contains three rows of dropdown menus: "* Retention Category:", "* Area:", and "* Units:". At the bottom of the dialog are two buttons: "Confirm" and "Cancel".

Figure 4-1 The dialogue box that appears when importing a CSV

- 4.2.3. Once confirmed, a dialogue box will appear to inform the user that the data load is complete. The listed data represents individual features as listed in the CSV with all the ascribed variables listed.

5. Common errors

Table 5-1 Common errors while using QGIS

Workflow stage	Error	Summary
QGIS Data Entry	Mis-aligned vertices	<p>A common issue when manually creating individual polygons is that vertices are not accurately aligned. This results in either overlapping polygons or gaps around the edges of features. This results in inconsistencies between habitat measurements and site areas, which leads to erroneous site valuations.</p> <p>Following the data entry guidance for creating a single site wide polygon and then dividing this using the 'split features' and 'fill ring' tools in QGIS removes the possibility of this happening.</p> <p>Where this is not possible careful use of snapping and tracing functionality in QGIS can be used to assist in reducing the likelihood of these errors. The 'check validity' tool is useful for identifying errors (Vector/Geometry/Check Validity).</p>
QGIS Data Entry	Missing Data	<p>All fields need to be completed. Given the staggered nature of data entry (baseline values then proposed values) and the potential for large numbers of features to be created, it is easy to omit data during the data entry process.</p> <p>Users can easily identify missing values by reviewing the attribute tables and sequentially sorting data by column headers.</p>
QGIS Data Entry	Incorrect combination of values	<p>Incorrect values may result from users inputting erroneous data or invalid combinations. Data entry should be made with reference to the Biodiversity Metric 4.0 Guidance to ensure that data conforms to requirements.</p>

Workflow stage	Error	Summary
		<p>Invalid combinations may also arise if users edit targeted variables without updating other impacted values.</p> <p>Users should ensure all variables remain valid each time the descriptive values of a feature are edited.</p>
Import tool	CSV data not loading into conversion.	Check the csv files are named following the guidance.
Import tool	Area / totals do not match.	<p>Total area represents column total for area data, whilst retention categories are based on which of these are labelled.</p> <p>A mismatch in the cross check of these totals will occur where null values have been encountered. This results when not all data has been labelled with a retention option.</p>

6. Example workflow

- 6.1.1. Firstly download the QGIS template. It will likely download as a zip file into the 'Downloads' folder. It is recommended that the user 'extracts' the zip file before copying or saving the QGIS template to the desired location.
- 6.1.2. Next, open the QGIS template – a QGIS Project named 'Net Gain Habitat Mapping' (Figure 6-1).

CSV References	02/12/2020 17:01	File folder	
Layers	10/12/2020 14:13	File folder	
Net Gain Habitat Mapping	10/12/2020 12:48	QGIS Project	198 KB

Figure 6-1 The QGIS project file

- 6.1.3. Import relevant basemap and reference layers (Figure 6-2).
 - Import existing layers (Layer / Add Layer / Add Raster Layer) or georeference in new raster data (Raster / georeference).

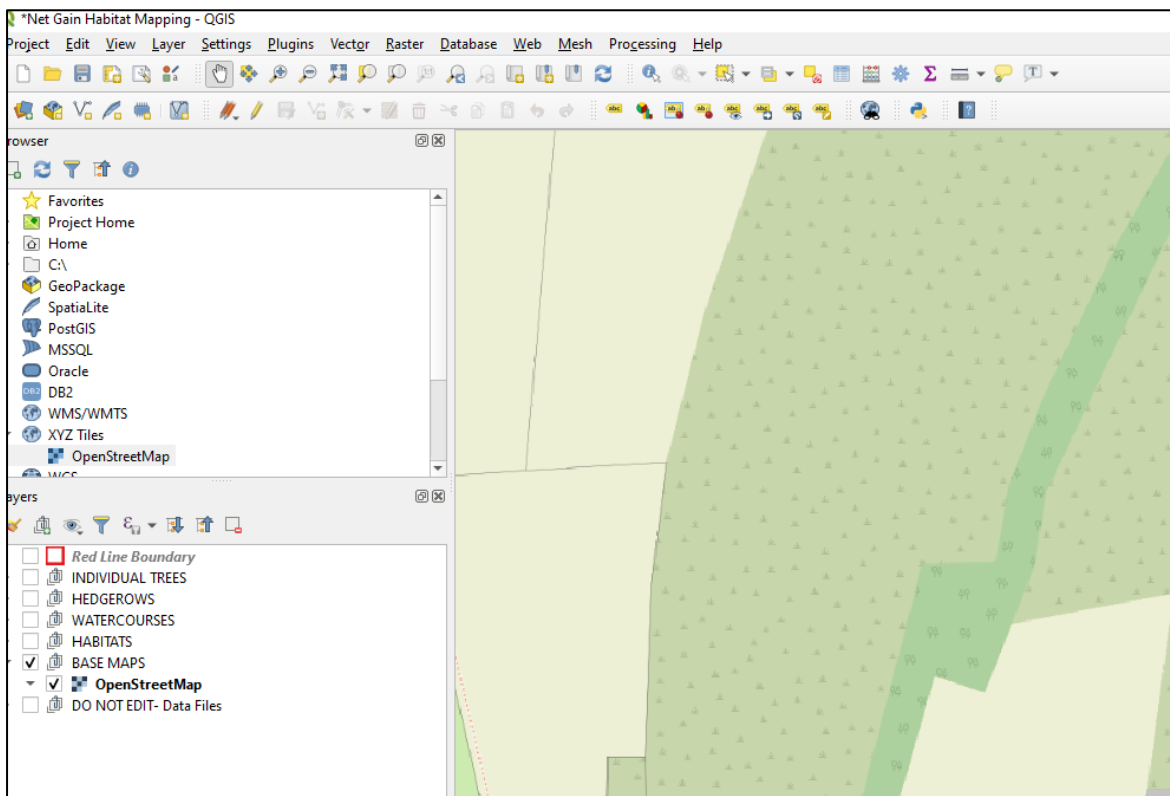



Figure 6-2 The QGIS template with a loaded basemap

6.1.4. Create a polygon representing the area of the site in the 'Red Line Boundary' layer or in a Habitats' layer to split into individual habitats (Figure 6-3).

- Use the 'create feature' tool  or copy and paste from an existing site boundary layer. Leave the values blank for the site area polygon.

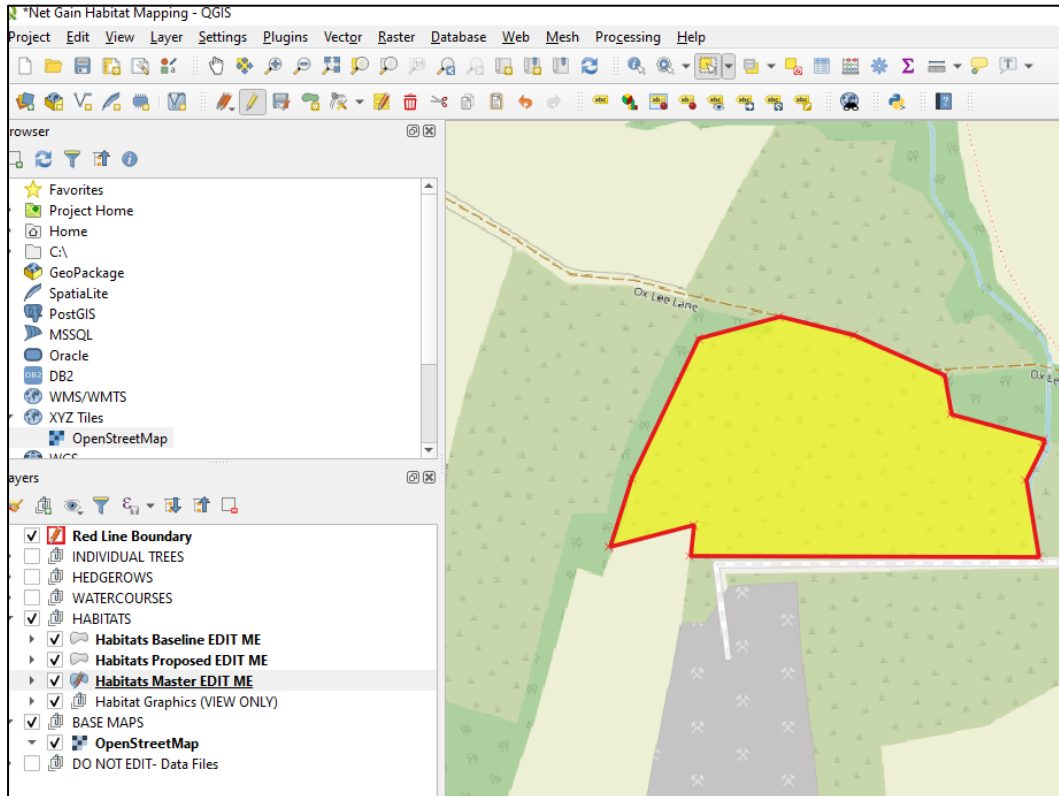




Figure 6-3 An example of a red line boundary polygon

6.1.5. Adjust the layer transparency if needed to allow the basemap to be visible and then divide the feature to match baseline habitats.

6.1.6. Use the 'split features'  and 'fill ring'  tools to cut out polygons (Figure 6-4).

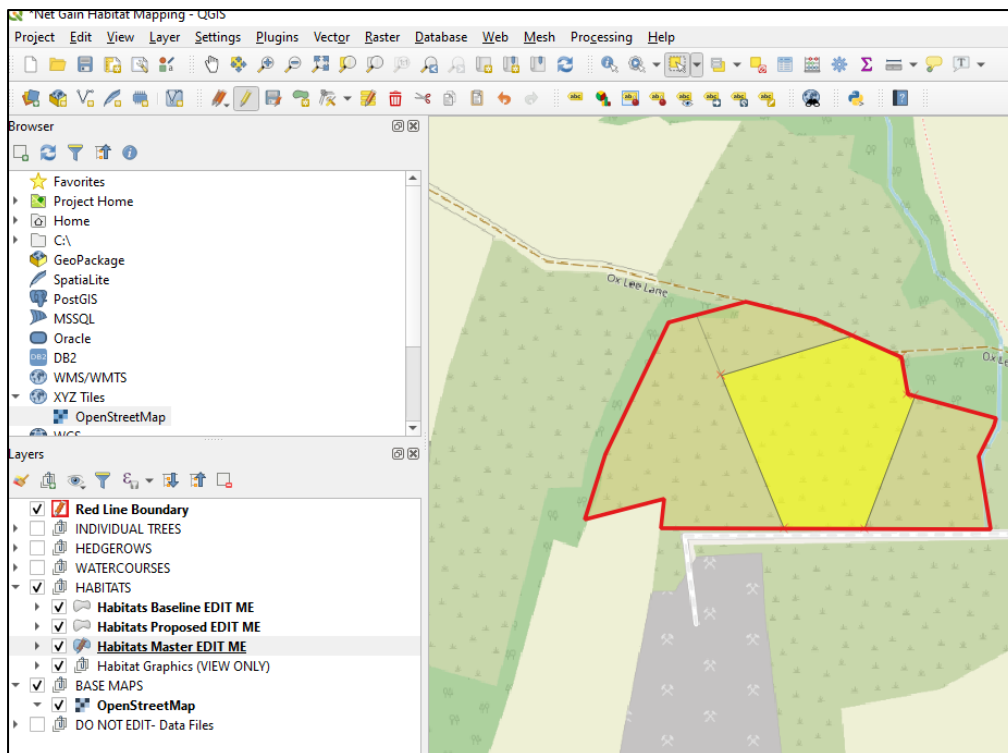


Figure 6-4 An example of a site area that has been split to represent habitat parcels


6.1.7. Once the site has been mapped, adjust the values within the attributes table (Figure 6-5).

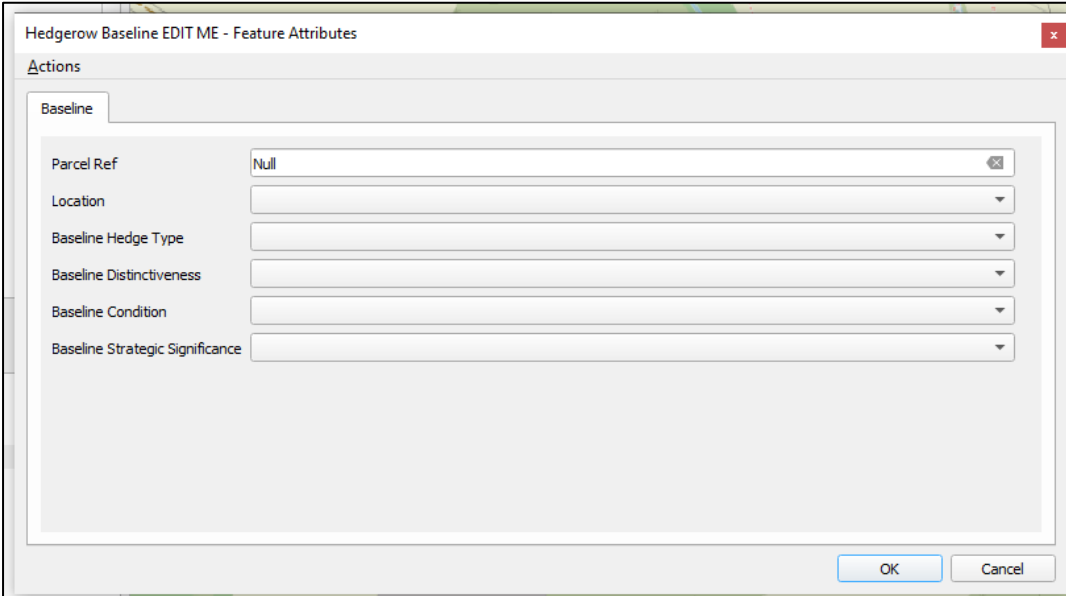
- As many variables are linked, it is important to work through the attributes table in a logical order, going from left to right.

Parcel Ref	Area	line Broad Habitat	aseline Habitat Typ	Baseline Condition	Baseline Strategic Significance	Retention Category	Proposed Broad Habitat Typ	Proposed Habitat
1	12993	Woodland and ...	Other woodlan...	Moderate	(Null)	(NULL)	(Null)	(Null)
2	6183	Cropland	Non-cereal crops	Condition Asse...	(Null)	(NULL)	(Null)	(Null)
3	11967	Heathland and ...	Hazel scrub	(no selection)	(Null)	(NULL)	(Null)	(Null)
4	3201	Urban	Other green roof	Good	(Null)	(NULL)	(Null)	(Null)
5	896	Cropland	Arable field ma...	Fairly Good	Area/compensation not in local str...	Lost	Lakes	Ornamental lak...
6	6291	Cropland	Cereal crops	Moderate	Area/compensation not in local str...	Retained	Cropland	Cereal crops
7	3885	Heathland and ...	Blackthorn scrub	Fairly Poor	Formally identified in local strategy	Lost	Urban	Developed land.
8	2734	Woodland and ...	Lowland mixed...	Poor	Formally identified in local strategy	Retained	Woodland and forest	Lowland mixed.
9	826	Sparsely vegeta...	Ruderal/Ephem...	Good	Area/compensation not in local str...	Lost	Wetland	Reedbeds
10	1275	Urban	Bare ground	Moderate	Area/compensation not in local str...	Lost	Urban	Developed land.
11	1629	Lakes	Ponds (non-pri...	Poor	Formally identified in local strategy	Enhanced	Lakes	Ponds (priority...
12	11125	Grassland	Other neutral g...	Poor	Area/compensation not in local str...	Retained	Grassland	Other neutral g...
13	20169	Grassland	Modified grass...	Poor	Area/compensation not in local str...	Enhanced	Grassland	Other neutral g...
14	1220	Wetland	Fens (upland a...	Poor	Formally identified in local strategy	Retained	Wetland	Fens (upland a...

Figure 6-5 The attributes table with editable drop-down menus

6.1.8. Next, enter the baseline hedgerows and watercourses using the relevant Baseline or Master layers. This can be done one feature at a time following the standard creation methodology.

6.1.9. When creating hedgerows or watercourses, use the  'add line feature' tool. Each time a feature is added this will trigger a dialogue box for data entry (Figure 6-6). If working in the Baseline layer the user will be presented with baseline specific variables. If working in the Master layer, users will be presented with two tabs, one for baseline values and one for proposed values. These can be completed later in the process by using the attribute table to edit the variables.



Hedgerow Baseline EDIT ME - Feature Attributes

Actions

Baseline

Parcel Ref Null

Location

Baseline Hedge Type

Baseline Distinctiveness

Baseline Condition

Baseline Strategic Significance

OK Cancel

Figure 6-6 The dialogue box that appears when you add a feature

6.1.10. The added feature will then appear on the map (Figure 6-7).

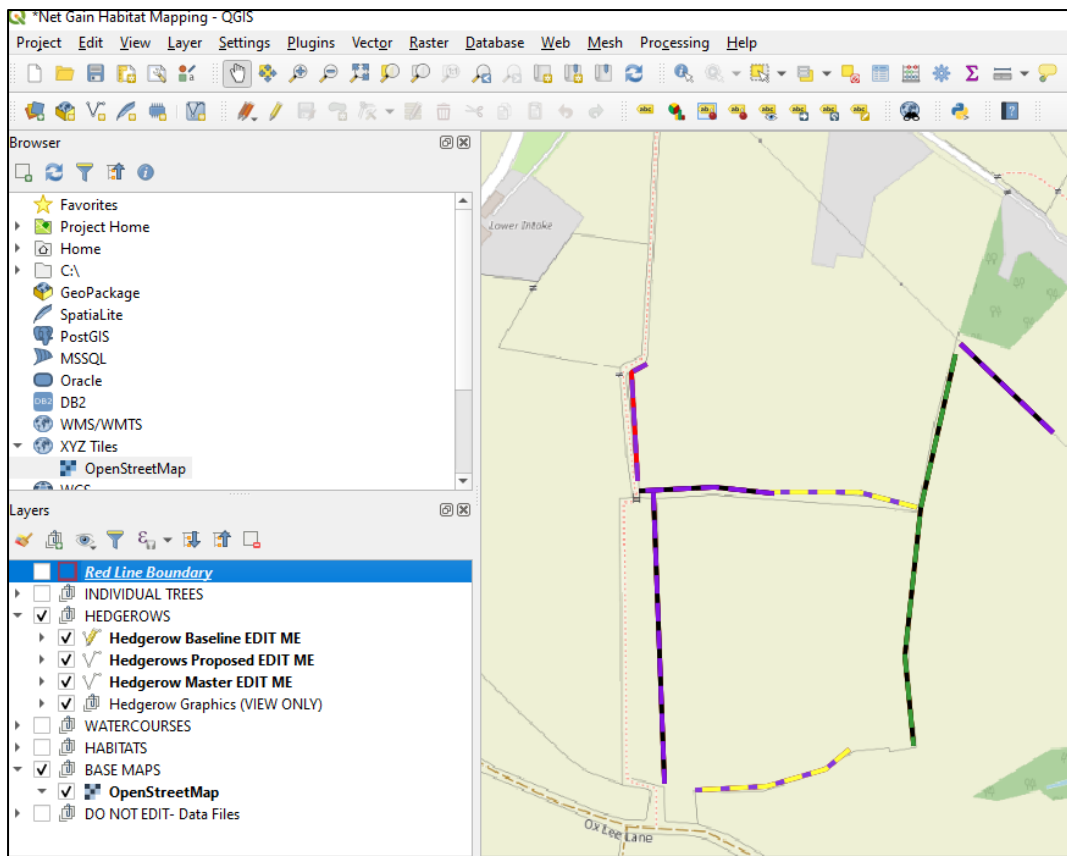


Figure 6-7 Hedgerows on the QGIS template

6.1.11. Once all the baseline data has been created, it is advisable to create a backup of the whole QGIS folder (Figure 6-8).




Name	Date modified	Type	Size
 QGIS baseline	11/12/2020 15:18	Compressed (zipp...	306 KB

Figure 6-8 A QGIS template saved, containing just the baseline

6.1.12. The next stage is to map the proposed values. Subdivide the baseline habitat polygons by the extent of the proposed habitats. This is most easily done in the Master habitats layer.

6.1.13. As with baseline edits, layer transparency can be adjusted to allow tracing of proposed features. Use the 'split features'  and 'fill ring'  tools to cut out polygons (Figure 6-9).

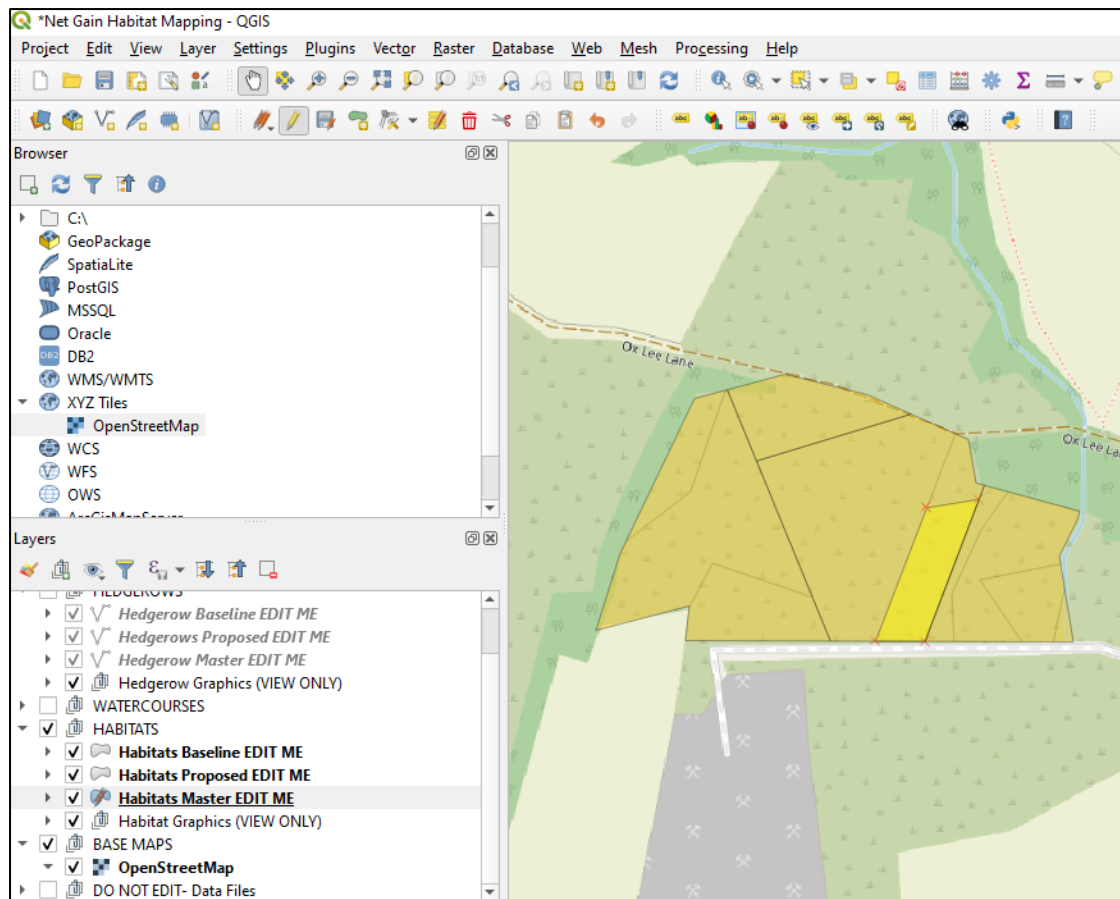




Figure 6-9 An example of the site area being split into proposed habitat parcels

6.1.14. Users can edit the proposed values as they progress.

6.1.15. For linear features, users will initially need to work in the relevant Master layer (stylings are set to proposed habitats for the proposed layer).

6.1.16. Newly created linear features can be added and existing features subdivided where there are differences in proposed outcomes (for example partial losses).

6.1.17. It is important to note that users should not manually delete sections of linear features that are to be lost – rather select the appropriate options within the attribute table to reflect this outcome.

6.1.18. Use the 'add line feature'  and the 'split features'  tools to create and divide linear features.

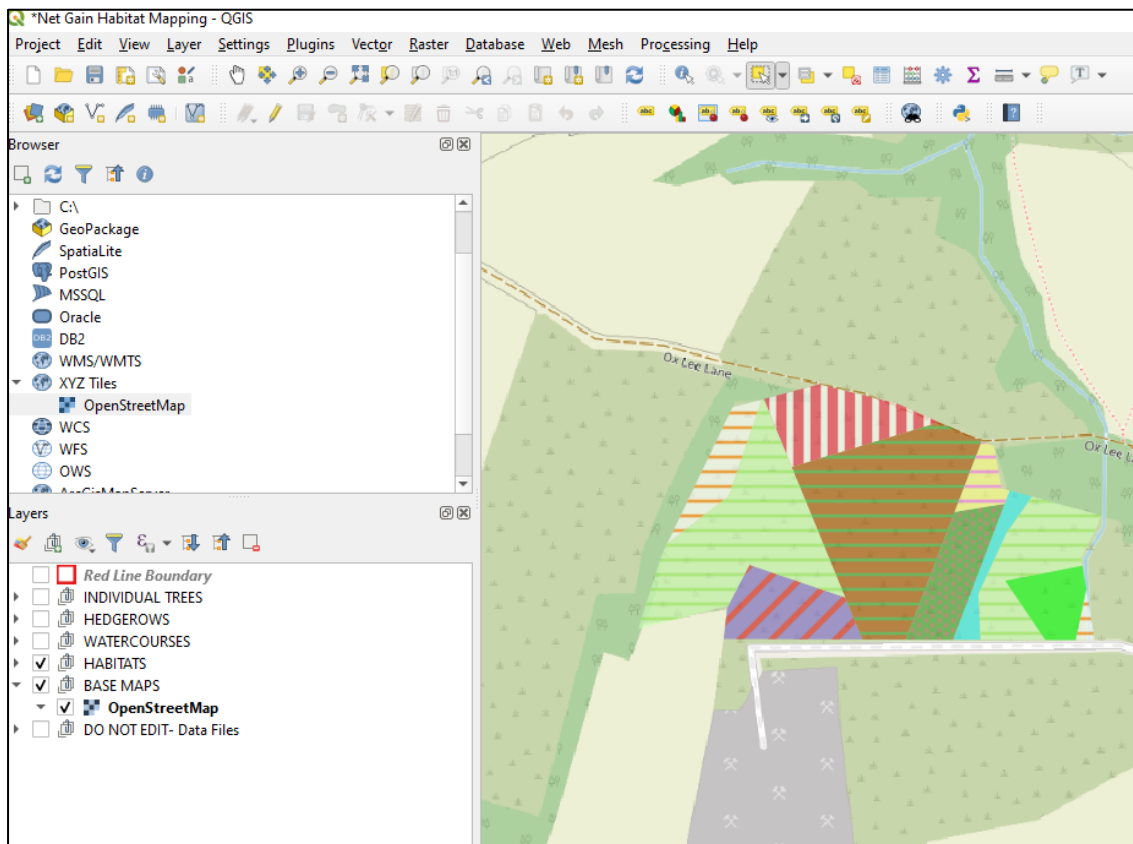


Figure 6-10 Proposed habitat parcels within a site

6.1.19. Once all baseline and proposed data has been entered for all the categories (Figure 6-10), users should review the Master layer attribute tables to sense check their inputs and ensure that there is no missing data.

- Users can quickly sort data by clicking on column headers in the attribute table. This is useful when checking for blank cells (Figure 6-11).

Parcel Ref	Area	Broad Habitat Type	Baseline Habitat Type	Baseline Condition	Baseline Strategic Significance	Retention Category	Proposed Broad Habitat Type	Proposed Habitat Type
4	9664	Woodland	Baseline Broad Habitat Type	Poor	Formally identified in local strategy	Enhanced	Woodland and forest	Lowland mixed
5	1220	Wetland	String (99)		Formally identified in local strategy	Retained	Wetland	Fens (upland a...
6	1275	Urban	Bare ground	Poor	Area/compensation not in local str...	Lost	Urban	Developed land
7	3201	Urban	Other green roof	Condition Asse...	Formally identified in local strategy	Retained	Urban	Developed land
8	826	Sparsely vegeta...	Ruderal/Ephem...	Moderate	Area/compensation not in local str...	Lost	Wetland	Reedbeds
9	1629	Lakes	Ponds (non-pri...	Poor	Formally identified in local strategy	Enhanced	Lakes	Ponds (priority...
10	1599	Heathland and ...	Hazel scrub	Fairly Good	Area/compensation not in local str...	Enhanced	Cropland	Cereal crops
11	2885	Heathland and ...	Hazel scrub	Poor	Formally identified in local strategy	Enhanced	Heathland and shrub	Mixed scrub
12	8885	Heathland and ...	Blackthorn scrub	Good	Formally identified in local strategy	Lost	Urban	Developed land
13	7483	Grassland	Modified grass...	Poor	Formally identified in local strategy	Enhanced	Grassland	Other neutral g...
14	11125	Grassland	Other neutral g...	Poor	Area/compensation not in local str...	Retained	Grassland	Other neutral g...
15	20169	Grassland	Modified grass...	Poor	Area/compensation not in local str...	Enhanced	Grassland	Other neutral g...
16	197	Cropland	Non-cereal crops	Condition Asse...	Formally identified in local strategy	Retained	Cropland	Winter stubble
17	896	Cropland	Arable field ma...	Condition Asse...	Area/compensation not in local str...	Lost	Lakes	Ornamental lak...

Figure 6-11 A QGIS attributes table

6.1.20. If not previously completed, users should complete the additional data fields within the master layers.

6.1.21. Once all data entry is complete and saved, and the user is confident that values are accurate, then the data can be exported as a CSV file for each habitat module – area habitats, hedgerows and watercourses).

- Export each Master layer by right clicking then selecting ‘Export’, then ‘Save Features As’. On the menu that appears ensure the format is set to - Comma Separated Value (CSV) (Figure 6-12). It is possible to de-select the ‘add saved file to map’ option at the bottom of the menu. Select an appropriate file name and save location of the output file.

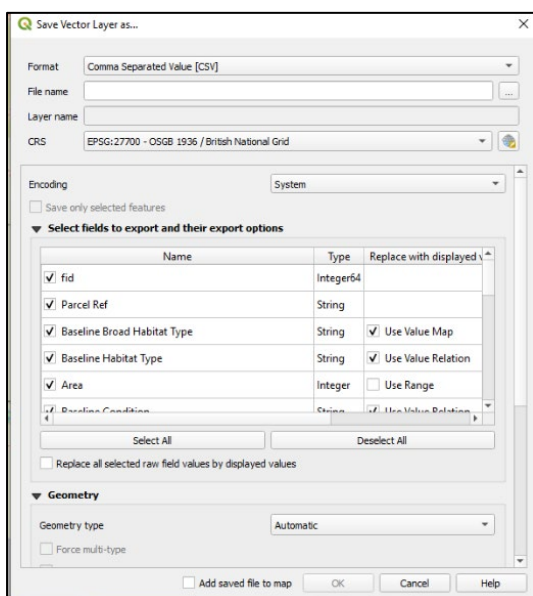


Figure 6-12 The dialogue box that appears when a layer is saved as a CSV

6.1.22. Open the Microsoft Excel GIS Import tool.

6.1.23. Select the tab for the relevant category (Habitats, Hedgerows or Rivers). Click on the button at the top labelled 'Import GIS CSV data (Figure 6-13). Navigate to the relevant CSV file and open.

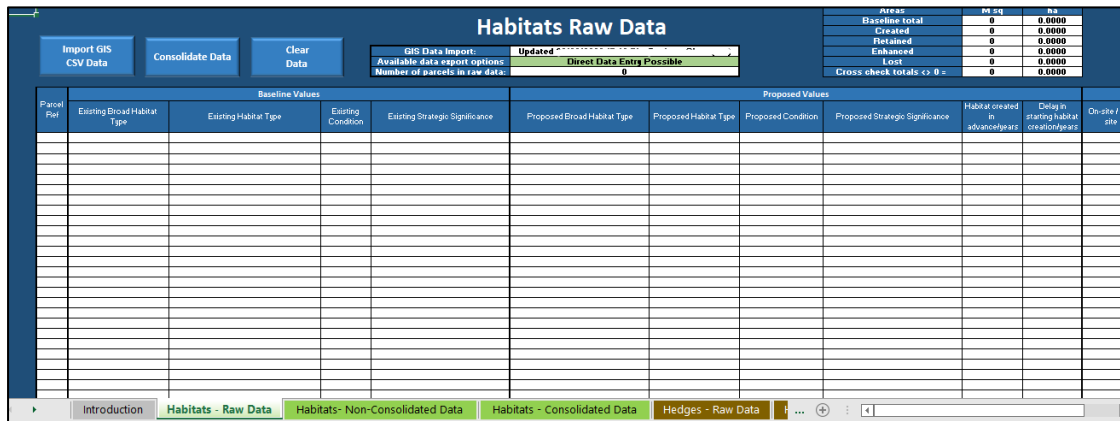


Figure 6-13 The import tool 'Habitats Raw Data' tab

6.1.24. Once the data has loaded, click the 'consolidate data' button (Figure 6-14).

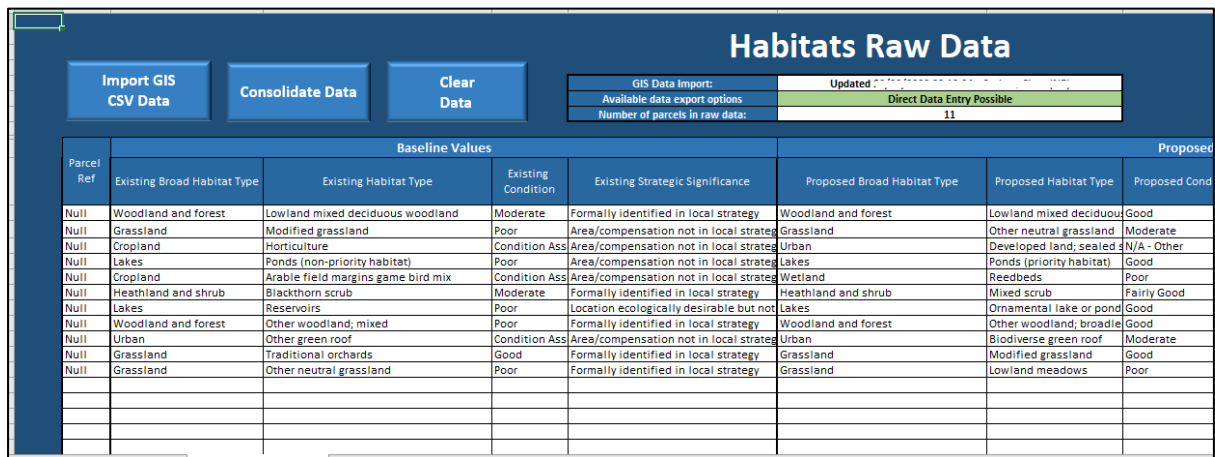


Figure 6-14 The import tool with data before it has been consolidated

6.1.25. Select the consolidated data tab. Click the 'Export Data' button for the main metric and 'SSM Export' for the SSM (Figure 6-15).

- If consolidated data is not needed, it is possible to export data from the non-consolidated data tab.

Habitats Consolidated Data								Areas	
On Site		Export		SSM Export				Total	ha
								9.84	
								3.86	
								0.00	
								5.98	

Existing Habitats								Broad Habitat Type	
Existing Broad Habitat Type	Existing Habitat Type	Total Area	Condition	Strategic Significance	Retained	Enhanced			
Cropland	Arable field margins game bird mix	0.901	Ition Assessment	Area/compensation not in local	0	0	Grassland	Modified g	
Cropland	Horticulture	0.8338	Ition Assessment	Area/compensation not in local	0	0	Lakes	Ornamental la	
Grassland	Modified grassland	1.0421	Poor	Area/compensation not in local	0	1.0421	Urban	Developed land; s	
Grassland	Other neutral grassland	1.1825	Poor	Formally identified in local strateg	0	1.1825	Wetland	Reeds	
Grassland	Traditional orchards	1.7605	Good	Formally identified in local strateg	0	0			
Heathland and shrub	Blackthorn scrub	1.0162	Moderate	Formally identified in local strateg	0	1.0162			
Lakes	Ponds (non-priority habitat)	0.9547	Poor	Area/compensation not in local	0	0.9547			
Lakes	Pseveroids	0.912	Poor	Location ecologically desirable but	0	0			
Urban	Other green roof	0.9324	Ition Assessment	Area/compensation not in local	0	0.9324			
Woodland and forest	Lowland mixed deciduous woodland	0.7663	Moderate	Formally identified in local strateg	0	0.7663			
Woodland and forest	Other woodland, mixed	0.4178	Poor	Formally identified in local strateg	0	0.4178			

Figure 6-15 The GIS import tool ‘Habitats – Consolidated Data’ tab

6.1.26. Select the main metric or SSM to import the data into.

6.1.27. The data will be loaded into the selected metric file. Repeat the above process for the remaining categories, and export into the same metric file.

- Be sure to save the metric file after the data is imported as this is not done automatically.

7. Appendix A: QGIS response options

7.1. Habitats

Table 7-1 QGIS options for area habitat variables

Variables	Response options
Parcel Ref	Edit with free text
Area	Automatically populated
Baseline Habitat Type	Restricted drop-down list (Linked to Baseline Broad Habitat Type)
Baseline Distinctiveness	Automatically populated (or select option in attributes table)
Baseline Condition	Restricted drop-down list (Linked to Baseline Habitat Type)
Baseline Strategic Significance	Drop-down list
Baseline UKHab	Automatically populated
Retention Category	Drop-down list
Proposed Habitat Source	Automatically populated
Proposed Broad Habitat Type	Restricted drop-down list (Linked to Baseline Broad Habitat Type and Retention Category)
Proposed Habitat Type	Restricted drop-down list (Linked to Proposed Broad Habitat Type)
Proposed Condition	Restricted drop-down list (Linked to Proposed Habitat Type)
Proposed Strategic Significance	Drop-down list
Proposed Distinctiveness	Automatically populated (or select option in attributes table)

Proposed UKHab	Automatically populated
Habitat created in advance/years	Drop-down list (Default = 0)
Delay in starting habitat creation/years	Drop-down list (Default = 0)
Location	Drop-down list
Spatial Risk Category	Restricted drop-down list (Linked to Location)
Fid	Hidden field (Automatically populated)

7.2. Hedgerows

Table 7-2 QGIS options for hedgerow variables

Variables	Response options
Parcel Ref	Edit with free text
Length	Automatically populated
Baseline Hedge Type	Drop-down list
Baseline Condition	Restricted drop-down list (Linked to Baseline Hedge Type)
Baseline Strategic Significance	Restricted drop-down list (Linked to Baseline Hedge Type)
Baseline Distinctiveness	Automatically populated (or select option in attributes table)
Baseline UKHab	Automatically populated
Retention Category	Restricted drop-down list (Linked to Baseline Hedge Type)
Proposed Hedge Type	Restricted drop-down list (Linked to Baseline Hedge Type and Retention Category)
Proposed Condition	Restricted drop-down list (Linked to Proposed Hedge Type)

Proposed Strategic Significance	Restricted drop-down list (Linked to Proposed Hedge Type)
Proposed Distinctiveness	Automatically populated (or select option in attributes table)
Proposed UKHab	Automatically populated
Habitat created in advance/years	Drop-down list (Default = 0)
Delay in starting habitat creation/years	Drop-down list (Default = 0)
Location	Drop-down list
Spatial Risk Category	Restricted drop-down list (Linked to Location)
Fid	Hidden field (Automatically populated)

7.3. Watercourses

Table 7-3 QGIS options for watercourse variables

Variables	Response options
Parcel Ref	Edit with free text
Length	Automatically populated
Baseline Watercourse Type	Drop-down list
Baseline Condition	Restricted drop-down list (Linked to Baseline Watercourse Type)
Baseline Strategic Significance	Restricted drop-down list (Linked to Baseline Watercourse Type)
Baseline Distinctiveness	Automatically populated (or select option in attributes table)
Baseline UKHab	Automatically populated

Baseline Encroachment into Watercourse	Drop-down list
Baseline Encroachment into Riparian Zone	Drop-down list
Retention Category	Restricted drop-down list (Linked to Baseline Watercourse Type)
Enhancement Type	Restricted drop-down list (Linked to Retention Category)
Proposed Watercourse Type	Restricted drop-down list (Linked to Baseline Watercourse Type and Retention Category)
Proposed Condition	Restricted drop-down list (Linked to Proposed Watercourse Type)
Proposed Strategic Significance	Restricted drop-down list (Linked to Proposed Watercourse Type)
Proposed Distinctiveness	Automatically populated (or select option in attributes table)
Proposed UKHAB	Automatically populated
Proposed Encroachment into Watercourse	Drop-down list
Proposed Encroachment into Riparian Zone	Drop-down list
Habitat created in advance/years	Drop-down list (Default = 0)
Delay in starting habitat creation/years	Drop-down list (Default = 0)
Location	Drop-down list
Spatial Risk Category	Restricted drop-down list (Linked to Location)
Fid	Hidden field (Automatically populated)

8. Appendix B: Summary of layers and default styles

8.1.1. Category – habitats, hedgerows and watercourses

Table 8-1 QGIS layers and their default styles

Variables	Response options
Category - Baseline	Baseline UKHab styling. Features have been assigned to specific, or closest defining UKHab style.
Category - Proposed	Proposed UKHab styling. Features have been assigned to specific, or closest defining UKHAB style.
Category - Master	Proposed UKHAB styling with additional styling to illustrate features without proposed values.
Category - Baseline Distinctiveness	Distinctiveness has 5 options (V.High, High, Medium, Low, V.Low). Hedgerows and watercourses are limited by feasibility.
Category - Baseline Condition	Layer specific condition options. Habitats have these options: Good, Fairly Good, Moderate, Fairly Poor, Poor, 'Condition Assessment N/A' and 'N/A – Other'. Hedgerows have these options: Good, Moderate, Poor and 'N/A'. Watercourses have these options: Good, Fairly Good, Moderate, Fairly Poor and Poor.
Category - Retention	Represents proposed change from baseline to proposed layers, with the options for: Lost, Retained or Enhanced. (Hedgerows and watercourses have the additional option of 'To be created').

<p>Category - Proposed Distinctiveness</p>	<p>Distinctiveness has 5 options (V.High, High, Medium, Low, V.Low).</p> <p>Hedgerows and watercourses are limited by feasibility.</p>
<p>Category - Proposed Condition</p>	<p>Layer specific condition options.</p> <p>Habitats have these options: Good, Fairly Good, Moderate, Fairly Poor, Poor, 'Condition Assessment N/A' and 'N/A – Other'.</p> <p>Hedgerows have these options: Good, Moderate, Poor and 'N/A'.</p> <p>Watercourses have these options: Good, Fairly Good, Moderate, Fairly Poor and Poor.</p>

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