

# **Field Handbook for Natural England hedgerow survey**

## **Guidance to support a Natural England-funded survey of hedgerows in English Countryside Survey squares 2022-23**

Authors: Maskell, L.C., Wood, C.M., Norton, L.R.

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**UKCEH contact details** Lisa Norton  
UK Centre for Ecology & Hydrology (UKCEH)

**Corresponding author** [lmn@ceh.ac.uk](mailto:lmn@ceh.ac.uk)

**Authors** Maskell, LM, Wood, CM, Norton LR  
UK Centre for Ecology & Hydrology

**Contributing authors & reviewers** Sier AJ, Smart, SM  
UK Centre for Ecology & Hydrology

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## Abbreviations used in this report

BH	Broad Habitat
CS	Countryside Survey
DBH	Diameter at Breast Height
GIS	Geographical information system
GPS	Global positioning system
MMU	Minimum Mappable Unit
NVC	National Vegetation Classification
PH	Priority Habitat
WLF	Woody Linear Feature

## Table of Contents

<b>1.</b>	<b>Mapping woody linear features</b>	<b>7</b>
1.1.	Background	7
1.2.	Structure of the editable layers	7
<b>2.</b>	<b>Mapping change in linear features</b>	<b>8</b>
<b>3.</b>	<b>Linear Features - Event Attributes</b>	<b>8</b>
3.1.	Introduction to woody linear features	8
3.2.	Recording Woody Linear Features	9
3.3.	WLF Natural shape	9
3.4.	WLF Unnatural shape	10
<b>4.</b>	<b>Methodology for mapping linear features</b>	<b>13</b>
4.1.	Background	13
4.2.	LINEARS vs. LinearEvents	13
4.3.	Spatial editing - LINEARS	14
4.3.1.	New Linear Feature	14
4.3.2.	Reshape	15
4.3.3.	Cut (Subtract)	16
4.3.4.	Delete	17
4.4.	Attributes – LinearEvents	17
4.5.	Spatial editing - LinearEvents	19
4.5.1.	Create new Event	19
4.5.2.	Reshape Event (adjust length)	20
4.5.3.	Cut (Subtract) Event (adjust length)	21
4.5.4.	Delete Event	21
4.6.	Checking Visit Status on Features	22
4.7.	Snapping	23
4.8.	Undoing and Saving Edits in SWEET	23
4.9.	Syncing survey squares offline	24
4.10.	Troubleshooting	26
<b>5.</b>	<b>Methodology for surveying vegetation in hedges</b>	<b>27</b>
5.1.	Hedgerow plots (H plots)	27
5.1.1.	Locating new H plots	27
5.1.2.	Finding previous H plot locations	27
5.1.3.	Laying out H plots	27
5.1.4.	Recording H plots	28
5.2.	Hedgerow diversity plots (D plots)	29
5.2.1.	New D plots	29
5.2.2.	Finding previous D plot locations	29
5.2.3.	Laying out D plots	29
5.2.4.	Recording D plots	30
<b>6.</b>	<b>VegPlots software</b>	<b>32</b>
6.1.	Location of veg plots	32
6.2.	Plot locations - Repeated plots	32
<b>7.</b>	<b>Data entry</b>	<b>33</b>

7.1.	Repeated Plots	33
7.2.	New plots (or editing a previously created plot)	34
7.3	Plot Recording in Veg Plots	34
7.4	Plot Header Information (Page 1)	35
7.5	Plot Specific Header Information (Page 2)	41
7.6	Entering Species (Page 3)	41
7.7	Recording H plots	43
7.8	Recording D plots	43
7.9	Bryophytes and Lichens	47
7.10	Submitting your data.	49
7.3.	Plot photos & Sketch Maps	50
7.4.	Plot Photo Protocol	50
<b>Appendix 1 - Collector &amp; Survey123</b>		<b>53</b>
<b>Appendix 2: Habitat key and allocation rules to broad and non-coastal priority habitats (adapted for GMEP)</b>		<b>63</b>

## 1. Mapping woody linear features

Linear features are landscape elements less than 5m wide that form lines in the landscape. Surveyors will record length and condition of a range of woody linear features. Linear features have a minimum length of 20m and may include gaps of up to 20m. All woody linear features (minimum length 20m, maximum width 5m) should be recorded **unless** they form part of a curtilage or they are within the woodland canopy. However, linear features running along the edge of woodlands must be recorded. Linear features which form part of a curtilage, (i.e., land intimately associated with buildings) at the boundary of urban and rural land should not be recorded.

### 1.1. Background

Surveyors are asked to record information on **woody linear features** for a 1km square on a digital map held on a Geographical Information System (GIS). Editing tasks will be carried out using a comprehensive range of pre-determined options.

Mapping methods have been slightly modified from the original Countryside Survey (CS) methodologies. However, it is important that we maintain consistency with methods used previously to allow us to look at historical trends and maintain a time-series of detailed, disaggregated environmental surveillance data, which can provide for a wide range of scientific applications and future shifts in policy emphasis.

### 1.2. Structure of the editable layers

The mapping data you will be working with are made up of **two spatial layers**.

These layers contain geographic data about linear and woody linear features – i.e., the locations of features – which are displayed on the map. They also contain attributes associated with each feature, provided in an associated table (e.g., the type of woody linear feature).

The two spatial layers and associated tables are as follows:

	Layers	Tables
<b>LINEARS</b>	This layer acts as a 'scaffold' for the LinearEvents spatial layer.	
<b>LinearEvents</b>	Linear features which fall along lines defined in the LINEARS spatial layer. These include woody linear features with an unnatural shape (i.e. hedgerows).	<b>SEVENTSDATA</b> Information related to features in the LinearEvents layer

The underlying table of attributes for the linear events are only accessed by selecting individual features from the spatial layers.

The table contains added information that is related to features in the spatial layer.

Please **DO NOT** GPS to map features. Using the GPS to check your location within a square is a good thing, but the mapping system was not designed to use a GPS to walk round features to create a GPS based map. This is because:

- Time for doing this has not been accounted for in timings for squares
- The GPS are not consistently accurate, it is more important that you map features well in relation to each other
- We don't need GPS precision maps - that is not how we use the data.

## 2. Mapping change in linear features

Surveyors will be provided with data from earlier surveys and are instructed to map change in woody linear features rather than mapping '*de novo*' (from scratch).

Surveyors will need to click on each linear event and either confirm that the data accurately represents what they see in the field or change it accordingly. Spatial accuracy is not a key aspect of the survey and therefore surveyors are asked to concentrate on the extent to which the data accurately represents the woody linear features in the survey square rather than their exact locations.

The task that surveyors will most commonly be carrying out in the field is checking and confirming and/or changing the attributes assigned to each woody linear feature by previous surveyors.

This will involve checking the event level attributes.

## 3. Linear Features - Event Attributes

### 3.1. Introduction to woody linear features

In most landscapes the linear features that are most important for biodiversity are the woody linear features. The term 'woody linear features' (WLFs) has been coined to account for the tremendous diversity of WLFs to be found in the countryside, including everything from a traditionally managed hedge to a planted avenue of trees or a line of old scrub which may at one time have been a managed hedge. WLFs fall into two broad categories based on the extent to which the trees within them take their natural shape.

- 'Natural shape' means unhindered/unmanaged growth for at least a decade. Where trees take their natural shape the feature will essentially be a line of trees or scrub – and is classified within Countryside Survey as a WLF Unnatural Shape.
- Where trees/scrub has been managed relatively recently the WLF will fall into the hedge category - and is classified within Countryside Survey as a WLF natural Shape.

When coding a WLF, surveyors will be asked to decide primarily whether trees take their natural shape and will then provide relevant information (as below) against each of these



feature types in order to enable us to group and assess the data appropriately.

### 3.2. Recording Woody Linear Features

Where gaps of 20 m or over exist in these features, they should be mapped either in individual sections of minimum length 20 m (including gaps <20 m, this will be explained!) or as individual trees/scrub, as appropriate. Where woody linear features are greater than 5 m wide at their base or more than one tree wide, they will have been mapped as a belt of trees or scrub (as appropriate). If you see drastic change in a feature that was recorded as a WLF – i.e. it is very much wider than 5m, you should record this as a **BELT of SCRUB (Forestry)**.

When coding a WLF, attributes will be recorded in data fields alongside the length and position of the feature as represented by the line drawn in the GIS data.

The primary question for surveyors mapping Woody Linear Features is then:

**‘Do individual trees within the feature take their natural shape?’**

**Yes** → WLF natural shape

**No** → WLF unnatural shape

Once this decision has been made the surveyor needs to fill in the following data fields, as relevant.

### 3.3. WLF Natural shape

**Theme: WLF Natural shape**

**Primary attribute: WLF Natural shape**

<b>Base height</b> - Height of <b>base</b> of canopy	<2m or >2m
<b>Height (modal)</b>	<1m, 1-2m, 2-3m, >3m (change to different category), 3-4m, 4-6m, >6m
<b>Width</b>	<1m, 1-1.5m, 1.5-2m, 2-2.5m, 2.5-3m, 3-4m, 4-5m
<b>Modal DBH</b> - diameter at breast height (DBH) for most trees along the length of the feature.	<3cm, 3-20cm, 21-50cm, 50cm-75cm, 75-1m, 1-2m, >2m
<b>Historic Management</b> - are there signs of historic management?	Yes or No (e.g. layered base, old coppice stools, slanting main stems with large vertical branches)
<b>Vegetation Type</b>	Trees/Woody
<b>Species</b>	Access to BRC list of trees and shrub species
<b>Proportion</b>	<10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%

### 3.4. WLF Unnatural shape

#### **Theme: WLF Unnatural shape**

#### **Primary attribute: WLF Unnatural shape**

<b>Height</b>	<1m, 1-2m, 2-3m, >3m (change to different category), 3-4m, 4-6m, >6m
<b>Width</b>	<1m, 1-1.5m, 1.5-2m, 2-2.5m, 2.5-3m, 3-4m, 4-5m
<b>Base height</b> - Height of <b>base</b> of canopy*	<2m or >2m
<b>Species composition</b>	mixed species, >50% hawthorn, >50% other
<b>Evidence Man</b> - Evidence of recent management	no recent management, newly planted, cutting e.g. flail or saw [<3yrs], laying or coppicing [<5yrs], both of the preceding
<b>Line of stumps</b> - Is the WLF a line of stumps?	Yes or No
<b>Vertical gappiness</b> (% of breaks which extend from canopy to ground) along the WLF.	<10%, 10-<25%, 25-<50%, 50-<75%

\* N.B. If >2m check that component woody species are cut or trimmed in shape, so are **not** in their natural shape. If they are in a natural shape record features for **WLF natural shape**.

The following images help to shed light on what is meant by some of the terms above. Width should be treated similarly to height, with a modal value taken. It is acknowledged that width categories may be insufficient for WLF's unnatural shape, but please just record the maximum width available if features are wider than 5m.

(Images courtesy of Colin Barr)

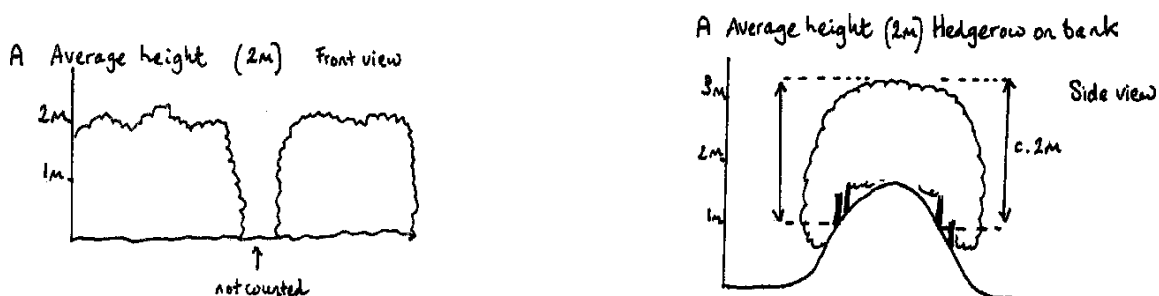


Figure. 1. Illustrations to help in the assessment of modal height (referred to here as average) in different circumstances N.B Modal as described above is different to what we usually think of as average (i.e. it is NOT the heights of different features added together and then divided by the number of features).

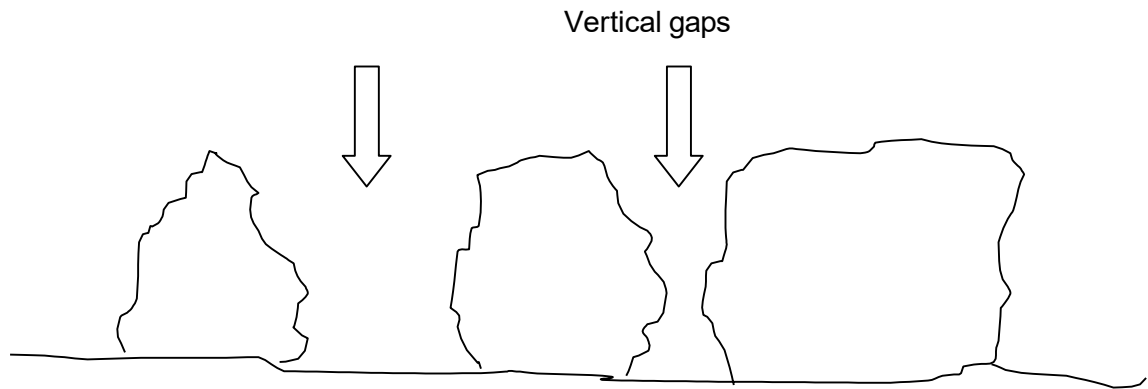


Figure. 2 Illustration of what is meant by vertical gappiness in WLFs

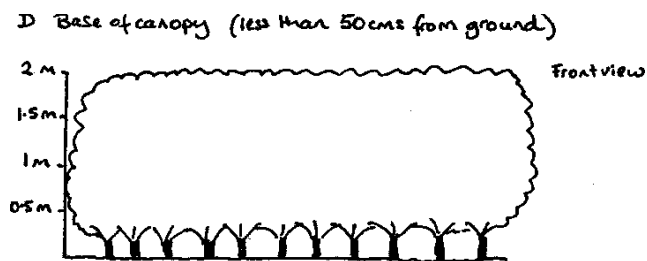


Figure. 3 Illustration showing Height of base of canopy (Base height)

The following set of images illustrate the kinds of features you will encounter. They should be coded as follows (numbering follows from left to right top to bottom):

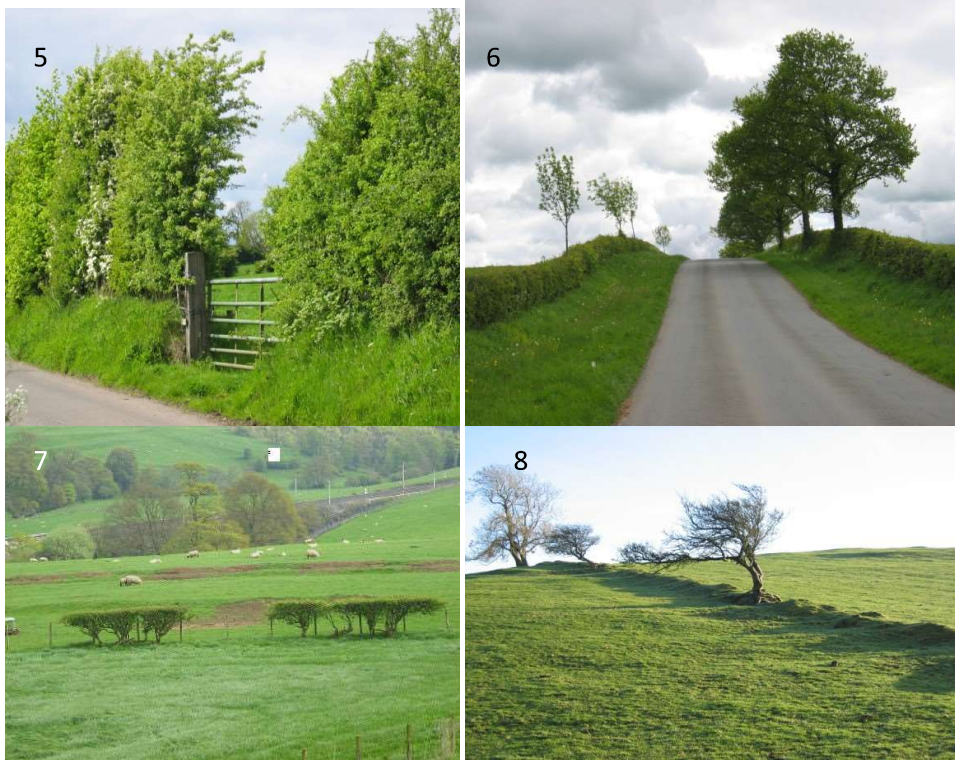
1. **WLF unnatural shape/line of stumps** – yes
2. **WLF unnatural shape x 2** – for the section closest in the picture /Base height <2m/Line of stumps –no/Height <1m/ Horizontal gappiness-<10%/Species composition->50% hawthorn/ Evidence of management-cutting e.g. flail or saw [<3yrs & margin widths (not possible to assess from this photo) for the section furthest away in the photo//Base height <2m/Line of stumps –no/Height -1-2m/ Horizontal gappiness-<10%/Species composition->50% hawthorn/ Evidence of management-cutting e.g. flail or saw [<3yrs & Margin widths (not possible to assess from this photo).
3. **WLF unnatural shape** /Base height <2m/Line of stumps –no/Height -, >2m-3m / Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of management- laying or coppicing [<5yrs] & Margin widths (not possible to assess from this photo).
4. **WLF natural shape** /Base height <2m/Species composition->50% hawthorn/ Signs of historic management -yes (Modal DBH)- 3-20cm & Margins –not present.
5. **WLF unnatural shape** /Base height <2m/Line of stumps –no/Height -, >2m-3m / Horizontal gappiness- <10%/Species composition->50%

hawthorn/ Evidence of management- cutting e.g. flail or saw [<3yrs] & Margin not present near side, impossible to assess from this photo for far side. An earth bank linear feature (see below) would also be recorded as part of this linear feature.

6. (Feature on right of road) WLF unnatural shape & WLF natural shape.
7. **WLF unnatural shape**/Base height <2m/Line of stumps –no/Height - <1m / Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of management- cutting e.g. flail or saw [<3yrs] & Margin not present near side, impossible to assess from this photo for far side. WLF natural shape (recorded from the first tree)/Base height >2m/Species composition – Fraxinus excelsior (possibly!)/ Signs of historic management-no/ Modal DBH-21-50cm& Margin not present near side, impossible to assess from this photo for far side.
8. **WLF unnatural shape**/Base height <2m/Line of stumps –no/Height - <1m / Horizontal gappiness- 25-<50%/Species composition->50% hawthorn/ Evidence of management- cutting e.g. flail or saw [<3yrs] & Margin not present either side.







## 4. Methodology for mapping linear features

### 4.1. Background

Each linear feature should continue to be collectively represented by a single line when multiple events are present e.g., two woody linear features (one a line of trees, the other a managed hedge). (This is to avoid the necessity of trying to accurately draw each component and assess its area).

New lines should be drawn as accurately as possible, using existing features for reference, as well as making full use of range finders, measuring tapes and compasses to position and measure them.

Where there is a step change in the events along a linear feature they should be coded and recorded as different events with their own set of attributes e.g., where a management of a WLF changes along its length resulting in a difference in height or where a section of hedge has a totally different species composition.

### 4.2. LINEARS vs. LinearEvents

Linear features on the map will appear as continuous lines (LINEARS).

Each continuous line represents a linear feature which may carry a number of different parts named 'LinearEvents' (or events) in SWEET.

The attributes of an event are all the possible descriptors for that event. Features which will be recorded as events on the map are listed below (LinearEvents). They include fences, walls, woody linear features etc. and are listed under all the available themes. We are only interested in woody linear features in this survey.

**A LINEAR must be in place before a LinearEvent (feature) may be placed along it.**

Think washing lines, without the line you can't hang anything on it.

### *Relationship between LINEARS and LinearEvents*



Linear feature 'LINEARS'

Linear event 1. (LinearEvents) 'Wall'

Linear event 2. (LinearEvents) 'Woody linear feature'

#### **In summary:**

LINEARS have no attributes and can be:

- Created
- Deleted
- Reshaped
- Cut

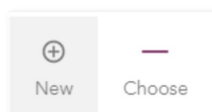
LinearEvents hold attributes and can be:

- Created (must be on a LINEAR)
- Length adjusted
- Cut
- Deleted

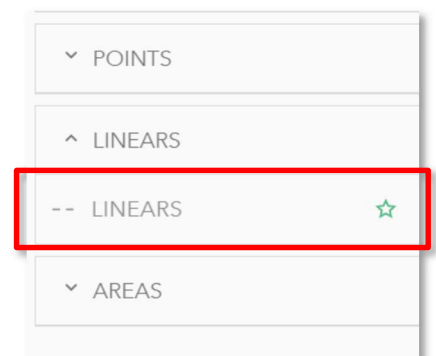
## 4.3. Spatial editing - LINEARS

### 4.3.1. New Linear Feature

- Zoom or pan to the location on the map display where the new line is to be added.
- If no Linear feature exists, click on Create, then Choose.



- Select LINEARS from the Choose menu.



- Draw a new line on the map by clicking and digitising a new linear feature. Finish by double clicking or click the tick (bottom right). Again, the zigzag button allows you to choose the type of drawing (standard, curves, follow, freehand).
- In order to record an event on the linear feature, repeat the steps above, choosing the appropriate LinearEvent, placing it along the created LINEAR for the appropriate length.



**Linears do not have attributes – these are on the LinearEvents**

**Lines cannot be added outside the survey square.**

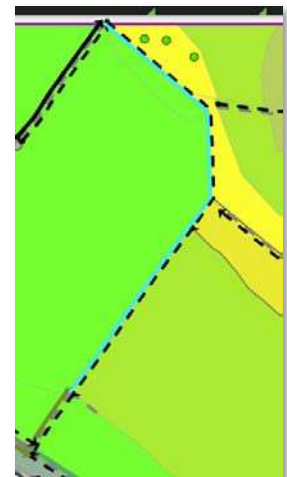
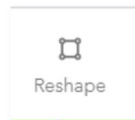
**Lines can only be added one at a time.**

**Lines must be 5.0 m long minimum.**

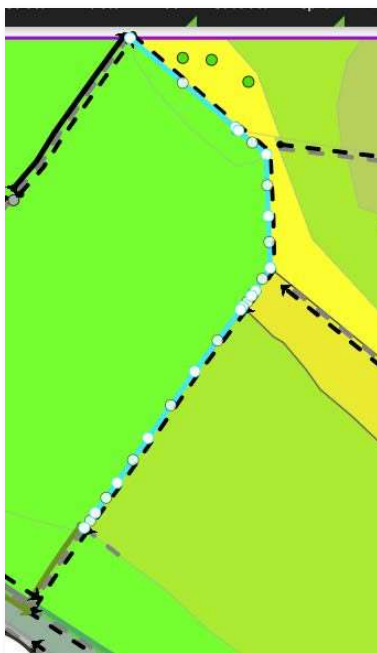
**A line cannot cross over itself.**

#### 4.3.2. Reshape

- Zoom or pan to the location on the map display where the line is to be modified.
- Click on or drag a selection box over the line which is to be modified.
- The selected line is shown highlighted in blue.
- Click on the Reshape button



Vertices which can be used to edit the shape of the line are shown along its length. Using the pen, the sketch can now be modified, with vertices added, deleted (by selecting a vertex and dragging it to the 'bin' (bottom right), and moved (by dragging) until the surveyor is satisfied that the line reflects how the feature looks in the field.



**If a modify edit would result in a line, or an event which is less than the minimum linear feature length, the edit will not be permitted.**

#### 4.3.3. Cut (Subtract)

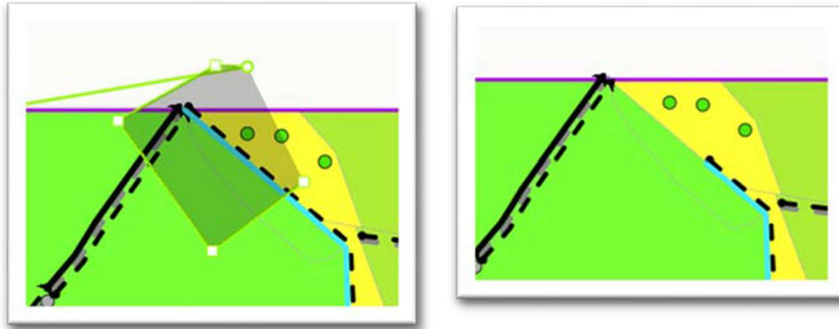
- Zoom or pan to the location on the map display where the line is to be modified.
- Click on or drag a selection box over the line which is to be modified.
- The selected line is shown highlighted in blue.
- Click the subtract button



- Draw a polygon which covers the section of line to be cut. Double click or click the tick button (bottom right) to finish. The line will be cut as specified.







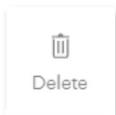
**Only one line can be cut with a subtract edit.**

**If a cut edit would result in a line, or an event, which is less than the minimum linear feature length, the edit will not be permitted.**

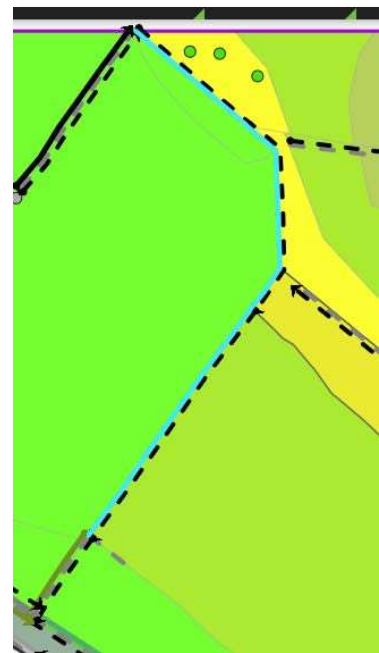
**A line cannot be deleted by a cut edit.**

#### 4.3.4. Delete

- Zoom or pan to the location on the map display where the line is to be modified.
- Click on or drag a selection box over the line which is to be modified.
- The selected line is shown highlighted in blue.
- Click the delete button:



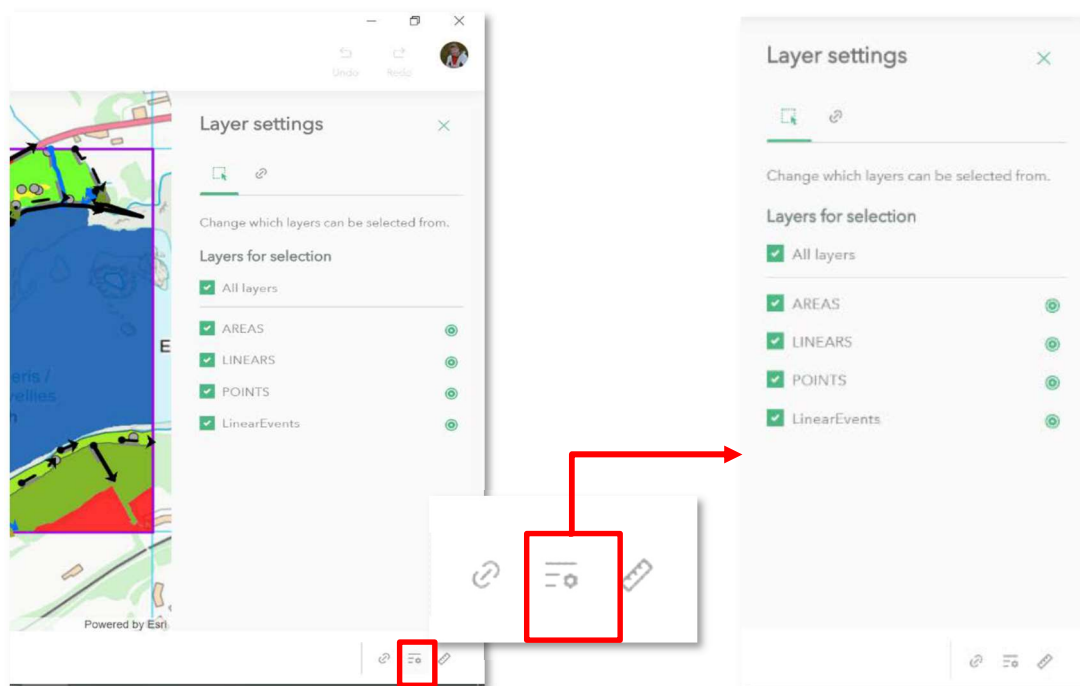
- The feature will be deleted.



#### 4.4. Attributes – LinearEvents

To edit (or review) a linear event feature, you must first ensure the LinearEvent features are selectable:

- Click on Select (top button)
- Select a Linear Event by choosing LinearEvents in the bottom Layer Settings menu.

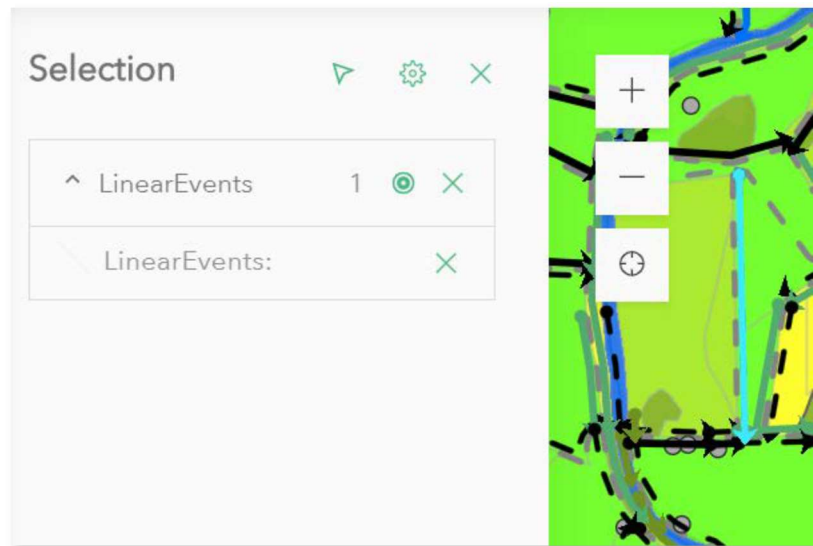


### LAYER CHOICE OPTIONS

Either choose layers to select from the boxes on the left, or the button to the right of the layer will select that layer and deselect all others.

- Zoom or pan to the location on the map display to select a line for event attribute update.
- Events can be selected by dragging a box across them. Selected lines are highlighted in blue.

**Tip:** To select only one LinearEvent, you can click on the 'Selected' button and choose the LinearEvent you want to edit from the menu.



- Click on **Properties** and the attribute editor will open, and details should be checked and/or changed for the linear feature.

**If the feature is a Woody Linear Feature (WLF) Natural Shape, you need to click on the *Related* button to add/edit species.**

**Lines can only have their event attributes updated one at a time.**

**Each line should contain at least one event.**

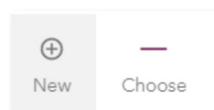
**Events must be a minimum of 5.0m long.**

## 4.5. Spatial editing - LinearEvents

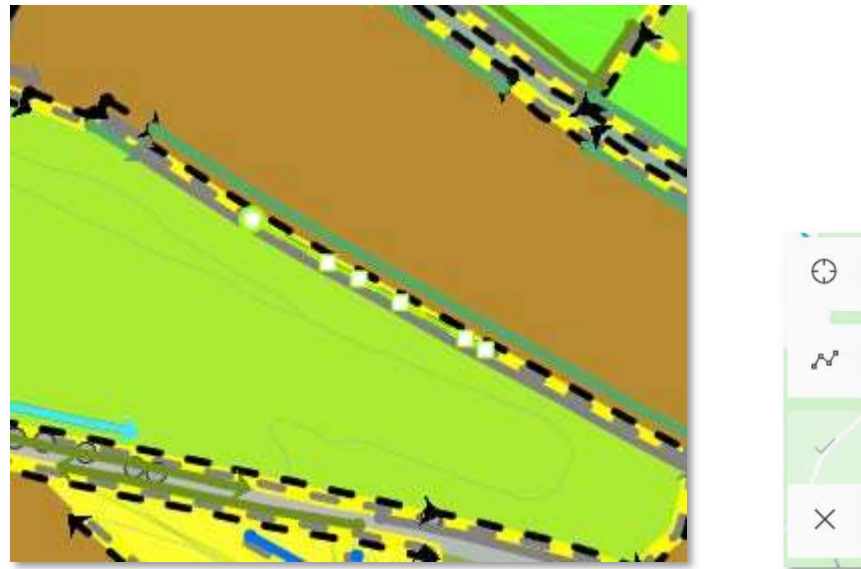
### 4.5.1. Create new Event

To add a new Event, a LINEAR feature must already be in place in the location of the feature (see above). You can then add as many events as you like along the LINEAR.

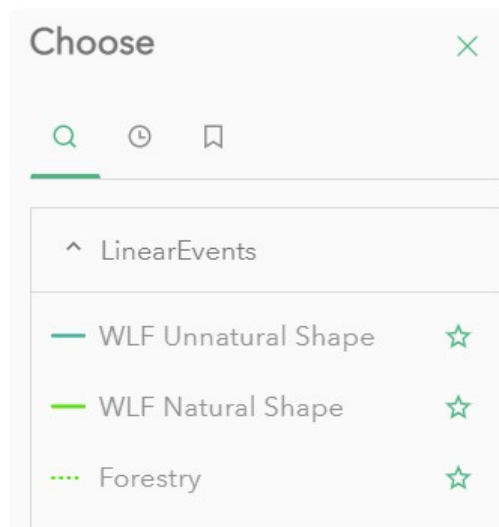
- Ensure LinearEvents are selected in the Layer Settings, then click on the **'Create'** button



- Select the feature of your choice from the menu
- Draw the event on the LINEAR as below. Double click or click on the tick button (bottom right) to finish.

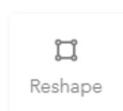


- Click on **Properties** to edit the attributes.

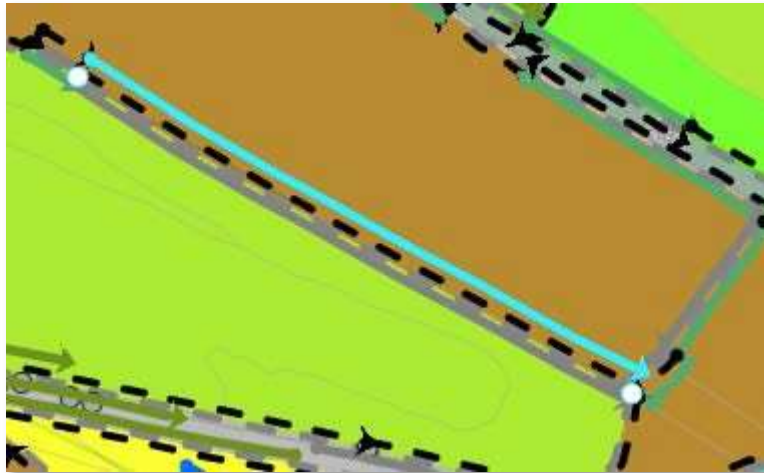


#### 4.5.2. Reshape Event (adjust length)

- Ensure LinearEvents are selected in the Layer Settings.
- Select event as described above.

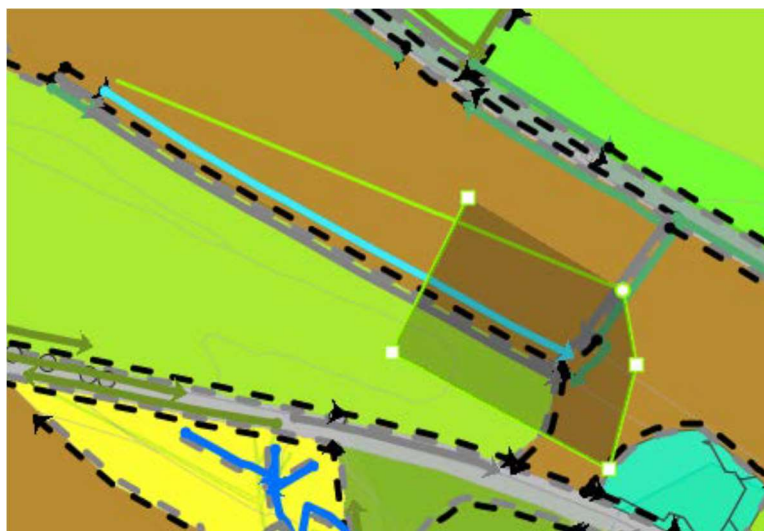


- Click on the Reshape button
- The length of the event may be adjusted by dragging the white dots to the appropriate position.



#### 4.5.3. Cut (Subtract) Event (adjust length)

- Ensure LinearEvents are selected in the Layer Settings.
- Select event as described above.
- Click on the Subtract button
- Draw a shape around the portion of the event to be cut

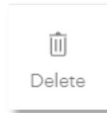


- Double click or click on the tick button (bottom right) to finish.
- The event will be cut to the chosen length.

#### 4.5.4. Delete Event

- Ensure LinearEvents are selected in the Layer Choices

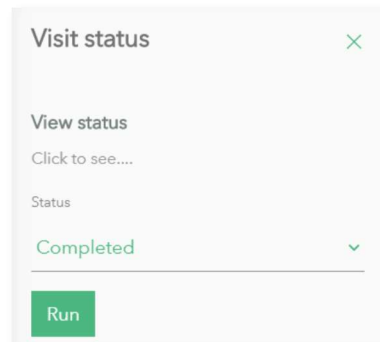
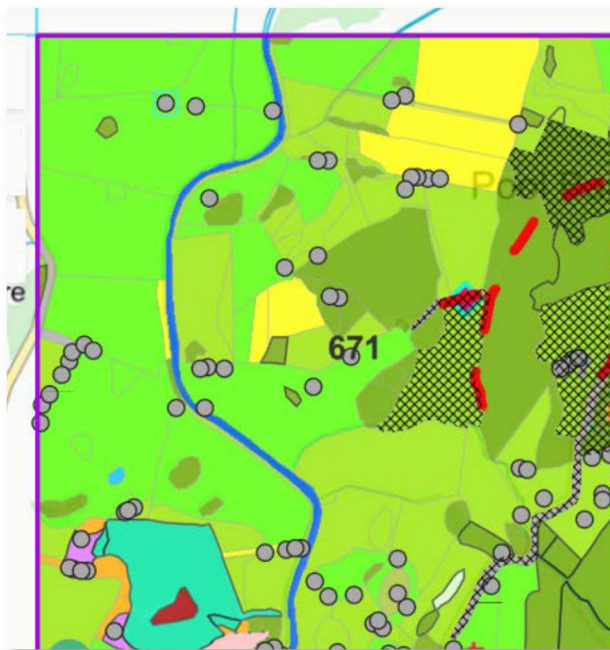
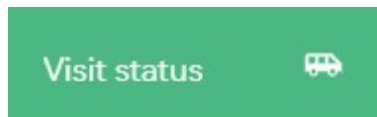
- Select event as described above
- Click on the Delete button.
- The event will be deleted



#### 4.6. Checking Visit Status on Features

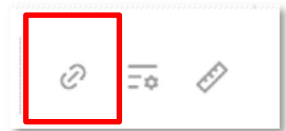
Once you have surveyed a few features, you might want to see how you are progressing. You can click on the button on the left marked with a **little bus**.

This will give you options which will highlight features according to their Visit Status. This will work for AREAS, POINTS and LINES.

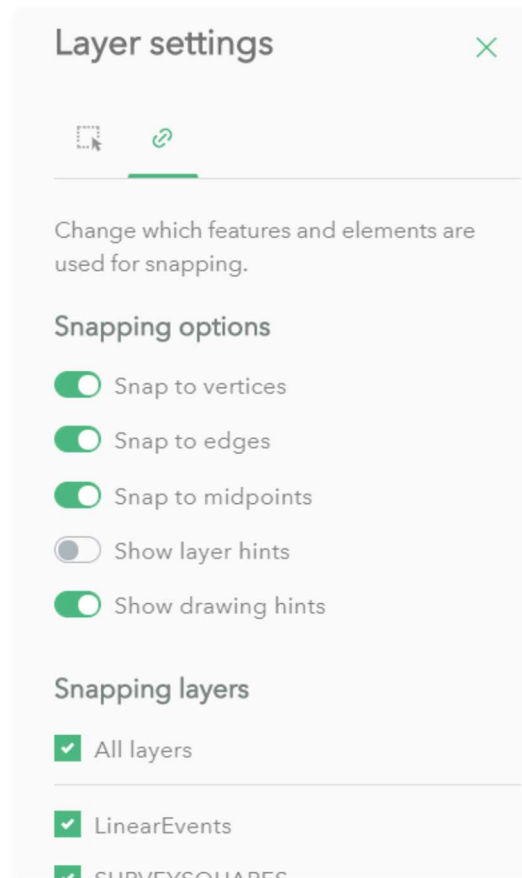


## 4.7. Snapping

Sometimes when editing, you may want your edits to follow the boundary, edge or location of another feature. To achieve this, you can turn on the 'snapping' feature. This is located in the bottom right.

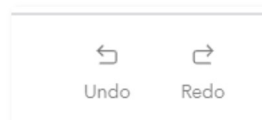


Clicking on the Layer settings next to the snapping on/off button provides a menu allowing you to adjust the snapping options as follows:



## 4.8. Undoing and Saving Edits in SWEET

Edits are saved as you go along in SWEET. You also have the option to undo or redo edits.

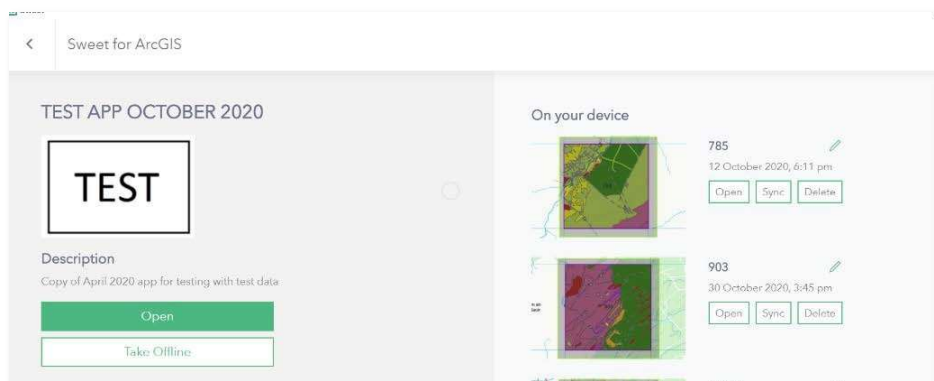


Once you have exited SWEET, undo/redo are not available from your previous session.

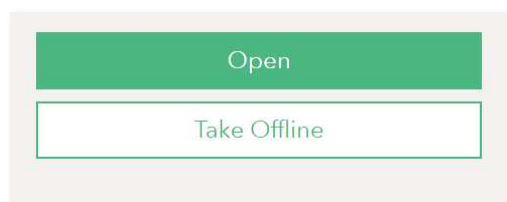
**DO NOT LOG OFF FROM SWEET when offline**

## 4.9. Syncing survey squares offline

- You need to sync data for each 1km square to get the data onto your tablet to work with
- Sync several squares (enough for 2-3 weeks) **when you have a good signal**
- When surveying, sync data back as often as you can, but **only if you have a good signal**.
- Back up your data using the backup dashboard. This will back up all synced squares on the tablet.
- Delete synced squares from your tablet once confirmed with the office by text or email they have synced back.



- You have 2 options: Open or Take Offline. To sync a square, choose 'Take offline'.

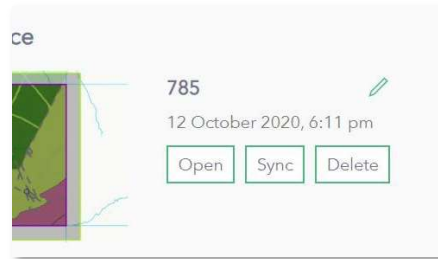


- Draw a square around the required survey square with the 'select' tool.
- Choose 'Download Area'.
- The area will show as 'Downloading'
- This will take several minutes depending on your signal (often ~ 30 mins, be patient).





- Once synced, the screen will look like this.
- You can rename the download with the square number.





Once data is synced, you can work offline 'Open' square to edit

- **'Sync'** to send data back to the office (online)
- **'Delete'** once a square is finished and data is confirmed as being synced successfully

#### 4.10. Troubleshooting

- **Back up procedures.** You have a 'UKSCAPE' backup dashboard on your desktop. Use this regularly to back up data. It will copy all squares currently synced to the tablet to a Micro SD card in the tablet (if present). If you insert a USB stick, it will also copy the backup to this.
- **I've accidentally logged out and have no signal.** The only way to solve this is to find somewhere with a Wifi or Mobile signal. Be careful not to log out when you are offline, as you will not be able to carry on working.

## 5. Methodology for surveying vegetation in hedges

This survey includes two different types of hedgerow plot, one which primarily surveys the hedge understory (H) and another which surveys the woody component of the hedge only (D). Surveyors will do 4 plots in each square. Ideally these will be the two H plots and the two associated D plots which sample the woody component of the adjacent hedge. However, if these fall within refused land, surveyors are asked to repeat one of the other D plots (done in 2007) and complete an associated H plot. D and H plots should be numbered as previously (should be D1, H1 and D2, H2), new H plots should be numbered with the number of the associated D plot and recorded as a New plot (New feature/Land cover). In addition, surveyors who have land under agri-environment schemes in their squares, as asked to record a D plot on a hedge which has been under an agri-environment scheme. These hedges will be indicated on a paper map which will be in your packs. Where the feature has been sampled previously with a D plot, this should be repeated. Where it hasn't a new plot should be placed and numbered D15.

### 5.1. Hedgerow plots (H plots)

H plots are linear 10 x 1m plots, which are associated with the large X plots within CS – maps and photos of all plots in each square are included in the square FAB (Field Assessment Booklet) on your tablet. Only two H plots have ever been done in CS, they go right back to the 1978 survey.

#### 5.1.1. Locating new H plots

If the hedge with which a plot was associated has disappeared since 2007 the plot should still be recorded as far as is possible **and** a new plot located on a hedgerow nearest to the previous H plot and to the nearest X plot (from which the previous, original H plot location would have been projected). This new plot should be renamed (H3, H4 etc.) and marked on the ArcMap plot map to enable plot recording.

To locate a new plot the surveyors should locate the hedge nearest to the X plot. The 10m x 1m H plot is laid out to the left and the 1m width extends out towards the field from the centre of the hedge. The H and B plots should not be nearer than 10m to each other, so if there is not more than 30m of continuous hedge in the square, only one plot (the B) should be recorded.

Where the nearest feature is ineligible (because it is not wide enough, or is confused by the presence of a different type of linear within its width – see below) then a new location should be chosen at the nearest permissible position. The position of a new plot will be marked on the GIS tablet and clearly marked on a sketch map.

#### 5.1.2. Finding previous H plot locations

Each plot should have been marked with a metal plate at the right hand end of the plot when you are facing it from the field. Check the plot map and photographs provided. We are not providing you with a metal detector because the plates are sometimes difficult to locate – plot maps and photographs are sufficient for relocation.

#### 5.1.3. Laying out H plots

H plots are each 10 x 1 m. The position of the plots should be temporarily marked with a survey pole at each end, one metre out from the centre of the hedge (see Figure 13). A measuring tape can be used to mark the outer edge of the plot.

If there is not a clear metre between the centre of the hedge and another linear feature, e.g. a ditch, then the hedge plot should be relocated at the nearest permissible location.

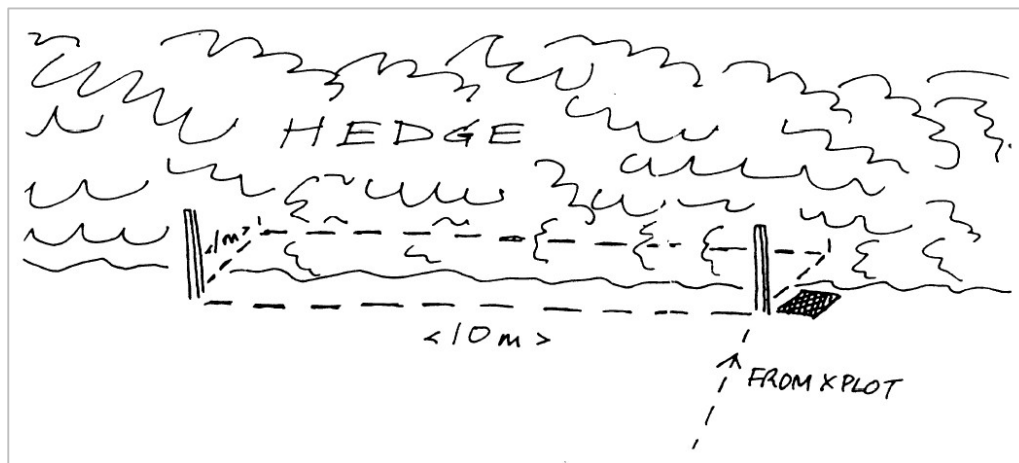


Figure 4. Laying out a hedgerow plot

#### 5.1.4. Recording H plots

##### HEADER

- Distance of crop from centre of hedge:  
Not Applicable, <2 m, 2-4 m, 4-6 m, 6-12 m, 12-20 m

## LISTED SPECIES

- Species presence and cover will be recorded.

## 5.2. Hedgerow diversity plots (D plots)

Hedgerow diversity plots were recorded for the first time in 1998. The overall purpose was to set up a baseline of plots to monitor woody species diversity in woody linear features (WLF's) and the presence of rarer woody species. In the 1998 survey, there was a tendency to locate plots on traditional hedges rather than on the broad range of woody linear features present in the countryside. In 2007 these plots were targeted more widely to include features classified as woody linear features in which trees take their natural shape.

As well as providing information on woody species diversity the data collected in D plots will also help to provide an assessment of the condition of hedgerows and other woody linear features by providing vital information about the size of the woody linear features, gappiness, levels of disturbance and species composition.

You are being asked to record just two D plots from CS2007 and where possible to include the D plots that are associated with the two H plots (as above). These will mainly be D1 and D2.

If you have time we would like you to gather data in a new D plot on a hedge that is labelled as having been under agri-environment agreement.

### 5.2.1. New D plots

New D plots should only be placed on WLFs with a length >20m (which can include gaps). They should be numbered from **D16** upwards. Use the 100 m grid overlaid on the Collector plot map to identify a point on the grid which is nearest to a point on the WLF that has been in scheme to find a location to sample it at, this point should form the centre point of the new plot.

### 5.2.2. Finding previous D plot locations

Except for plots co-located with H plots which are marked as for H plots, D plots were marked at the centre point along the 30 m length. The plate was buried 50 cms out from the centre line of the WLF. Please check plot map.

### 5.2.3. Laying out D plots

Each plot is 30 m long and includes the full width of the WLF. The plot does not need to be fully marked out but, rather, the rangefinder could be used to check the length of the plot (15 m in each direction from the centre point) (see Figure 15). The D plot should incorporate the H plot in the central 10m of the 30m, this should be clear on the map. In some cases the H plot may be first 10m from one end of the plot – again, this should be clearly marked on the plot map.

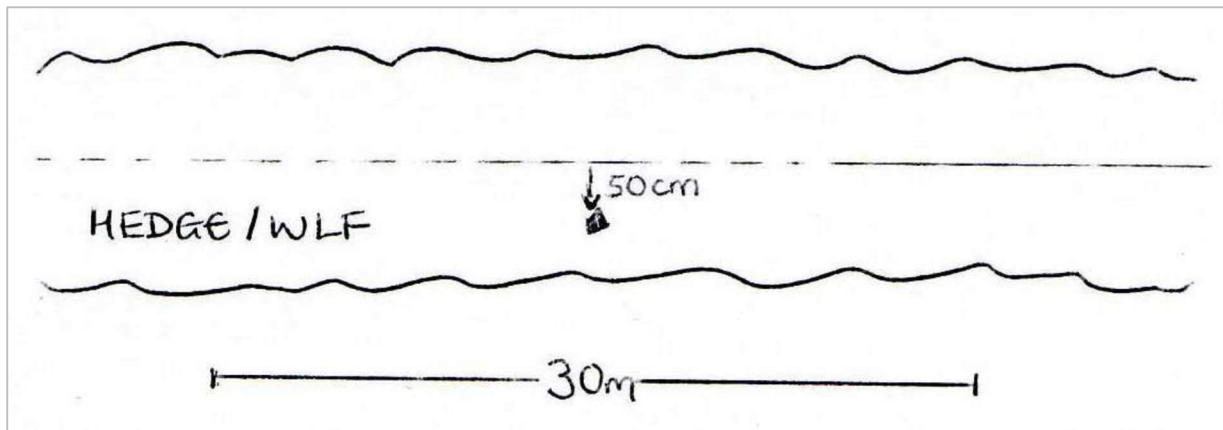


Figure 5. Laying out a hedgerow diversity plot

#### 5.2.4. Recording D plots

D plots may be placed on either of the types of WLF described in the Mapping handbook or on linear features which comprise of both. Where a D plot contains both recording should be carried out on the WLF in which trees do NOT take their natural shape.

#### HEADER

There is a **lot** of D plot information. These plots provide a lot of information on which condition of WLF's is assessed:

- Modal Feature height (excluding earth banks, see illustrations for measuring asymmetric WLF heights) (modal height is the average for most of the length of the feature rather than an average between the tallest and shortest part of a feature): <1m, 1-1.5m, 1.5-2m, 2-2.5, 2.5-3m, 3-4m, 4-6m, 6-15m, >15m (see fig 1).
- Feature width : <1m, 1-1.5m, 1.5-2m, 2-2.5, 2.5-3m, 3-4m, 4-5m, 5-10m, >10m
- Vertical Gappiness % gappiness: none, <10%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%
- Are there gaps >5m: Yes, No
- Distance of adjacent managed or ploughed land from centre of WLF ): Not Applicable, <2m, 2-4m, 4-6m, 6-12m , 12-20m
- Are there trees that take their natural shape? : Yes (forming a separate layer above a shrubby WLF), Yes (but there is no separate shrubby layer), No
- Are trees and shrubs?- Uniform in height, Different heights
- Height of base of canopy : <0.5m, 0.5-1m, 1-2m, >2m
- Width perennial vegetation : <1m, >1m, Not Applicable
- If trees present are the tree or shrub canopies touching? : Not at all, Partially, Mostly, Completely, Not applicable
- Are there any signs of historic management? (e.g. layered base, old coppice stools, slanting main stems with large vertical branches. Yes, No

- D Plot: Invasive Species Presence/Cover

- *Leylandii*: <10% , >10%
- *Fallopia japonica*: <10% , >10%
- *Crocsmia aurea* hybrid (Montbretia): <10% , >10%
- *Fallopia sachalinensis*: <10% , >10%
- *Fallopia x bohemica*: <10% , >10%
- *Fallopia baldschunica*: <10% , >10%
- *Heracleum mantegazzianum*: <10% , >10%
- *Impatiens glandulifera*: <10% , >10%
- *Petasites albus*: <10% , >10%
- *Petasites fragrans*: <10% , >10%

- Recording if a plot is under agri-environment scheme (AES)

You will have a paper map which indicates hedges under agreement, where there are some (not all squares have agreements). The information on these maps and the associated excel file with notes (which we will provide you with digitally and on paper) will be provided as part of your square pack. The information provided is inconsistent and some of it is not all that helpful. However, we hope that you can use it to identify a hedge on which to put a D plot. Hedgerows under AES will be marked as being under

- 1) a restoration option (coppicing, gapping up, laying);
- 2) a planting option (establishing a new hedge) or
- 3) a management option (cutting and trimming options).

Please identify a hedge which is under either Planting or Restoration as a priority and if not available go for one under management. If you have any notes on the hedges which you put your D plot on please put them on the map or excel sheet, especially if there is a new hedge which wasn't previously recorded.

Please indicate if the plot is covered by an agri-environment scheme hedgerow option (as below), leave 'Yes' box unchecked if no AES.

▼ D plots

WLF under AES?

☒ Yes

AES Type

☒ Restoration
 ☐ Planting
 ☐ Management

## LISTED SPECIES

Woody species presence and cover only (not including gaps) are recorded. This includes woody climbing species such as *Rosa canina*, *Rubus fruticosus* and *Clematis vitalba*.

## 6. VegPlots software

Survey plots are recorded with the VegPlots software– these plots are a repeat of the CS baseline of fixed vegetation plots located within the sample of 1km squares. Surveyors will use a habitat key (Appendix 2) to classify the polygon or that is adjacent to each linear plot. The survey involves recording plant species presence and abundance in the different types of vegetation plot as described above. Being able to record plots by re-finding their exact location is a very important part of the survey. Accurate recording of the repeat plots from previous surveys will provide the data needed to quantify changes in the countryside with great precision. In order to maintain this valuable dataset it is essential that the following information is collected for each plot.

- **General information** about the plot including plot number and type, vegetation height etc. (header information) as well as species presence and (usually) cover.
- **Plot photo** – for plot relocation (i.e. finding the position of the previously recorded plot) by surveyors in the next survey and to provide visual information about the plot.
- **Plot sketch map** – to enable surveyors to find the same plot location in subsequent surveys. You will be provided with plot maps made by previous surveyors – hopefully these will enable you to find the plots easily. If not, or if you are adding a new plot, you will need to create a plot map which will enable surveyors to refind your plots in the future (possibly in a decade's time).

Note that because this is a repeat survey, photos and sketch maps will be available from the previous survey to enable plots to be recorded in the same location.

Most of this data will be collected in a digital format. To this end, apps based on ESRI's 'Survey123' and 'Collector' software will be used, named '**Vegplots**'.

For ease of use, plot maps will be provided to surveyors on paper although digital copies will be available on the tablet and newly drawn onto paper/tablet.



### 6.1. Location of veg plots

In the previous survey (CS), plots were placed and recorded in all 1km squares.

### 6.2 Plot locations - Repeated plots

In the previous survey, plots may have been located in any part of the 1km square, apart from within urban areas, land without access permission, inland water and sea or other dangerous and inaccessible land.

Where new plots are being recorded for the first time, e.g. new plots sampling hedges under AES schemes, specific instructions for locating particular plot types are given in section 5 above. It is important to record the location of the plot as accurately as possible with sketch maps, photos and GPS.

To access a map showing the locations of previously surveyed plots, the surveyor will need to open up *Collector*.

The precise locations of individual plots are described using:

- a GPS location (do not rely on this alone, you definitely need the following too)
- a sketch map per plot
- a series of associated photographs to aid re-finding the plot

In most cases there will be one map per plot but some co-located plots maybe described on a single map, for example H, D, B and X plots (i.e. random points in fields and nearby boundaries) because these plots were originally located in relation to one another.



## 7. Data entry

### 7.1. Repeated Plots

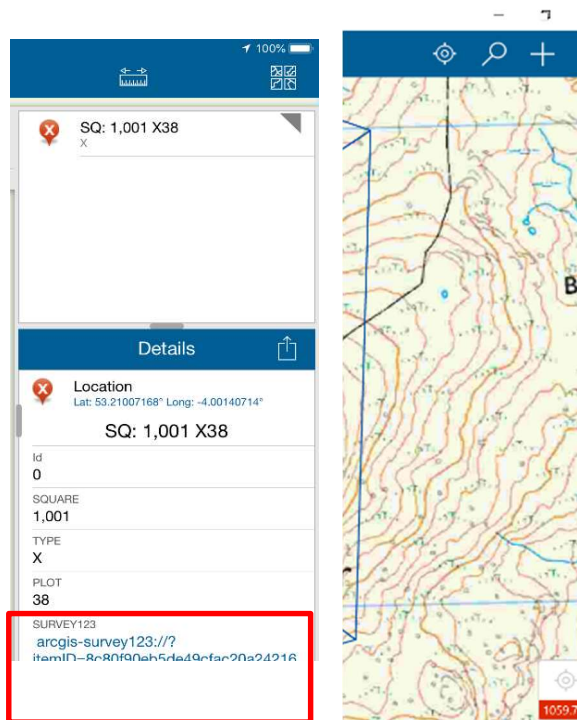
#### *Collector*

In order to begin plot data entry, you will open ESRI's Collector app. Open the map (name tbc in training), on which the plots will appear. You can then:

1. Navigate to the plot using this map
2. When you get to the plot, click the plot symbol. A window will open.
3. Click on the [survey link](#) in the window - this will open a new form to enter the plot data (it's a bit slow, so be patient)



**Note:** If you have already started a form for a plot, do not do this. Instead, follow the instructions in section 7.2. for opening a plot in Survey123 below. Those instructions also apply if you cannot open the form from the Collector app, for some reason.



For further technical notes regarding *Collector*, see Appendix 1.

## 7.2. New plots (or editing a previously created plot)

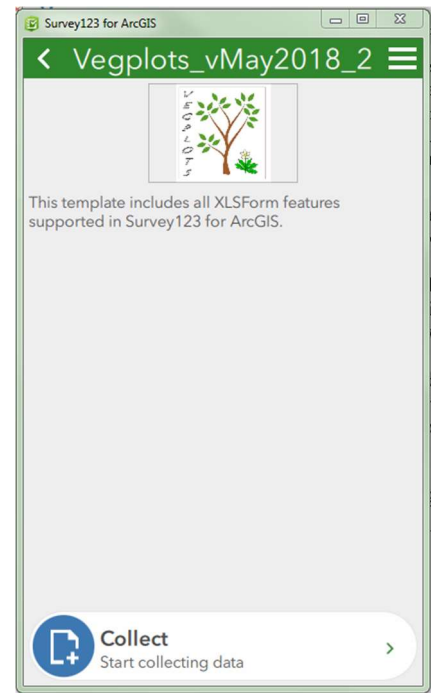


In order to begin plot data entry for a plot not featured on a previous map (i.e. the plot was lost (see figure below) or not found; or editing a previously created plot), the recording forms are launched by selecting the relevant survey from 'My Surveys' within Survey123, then selecting 'Collect' as

illustrated below.

This will launch the survey forms, starting with the general plot (header) information on page 1 (this may take a few seconds – be patient!)

Note: For further technical notes regarding *Survey123*, see Appendix 1.



## 7.3 Plot Recording in Veg Plots

**Take care to disturb the vegetation as little as possible - this applies particularly to fragile assemblages in flushes and other wetlands - but bear in mind that a full census of the vegetation species composition is required.**

### ***Plot level information***

There are three recording pages for the following categories.

- **PAGE 1: PLOT HEADER INFORMATION** – site name, recorders, slope, aspect, location, photos
- **PAGE 2: PLOT SPECIFIC HEADERS** – information that is specific to the current plot type
- **PAGE 3: VEGETATION PLOT.** Ground Flora - presence and absence in a range of plot types. Major common bryophytes should be recorded but a full list is not expected (see Section 6).

**Please ensure you record information for all plots in the square – this includes header information for those that are refused, inaccessible etc. It is important to know why a repeat plot has not been re-recorded.**

## 7.4 Plot Header Information (Page 1)

If the plot was launched from within the *Collector* map (or is being edited from a previously created plot), Square, Plot Type, Plot Number and Plot ID will be already entered at the top of the form consisting of the following:

- **Square** – Survey square number
- **Plot Type** - A,B,D,H,M,S,U,W,P,X,Y
- **Plot Number** - 1, 2, 3,...
- **Plot ID** (filled automatically) = Square + Plot Type + Plot Number

*If the plot is new, these can be filled in manually – **take care to enter the correct details.***

- **Surveyors** – choose names
- **Plot recorded** (see below)
- **Location** (geopoint) will be captured automatically if your device has an (offline) GPS. If you are online (either mobile data or WiFi), a map will appear to make it easier to


ascertain how accurate the location is. In some cases, you may also wish to use a handheld GPS and make a note of the reading in the 'notes' box lower down the page.

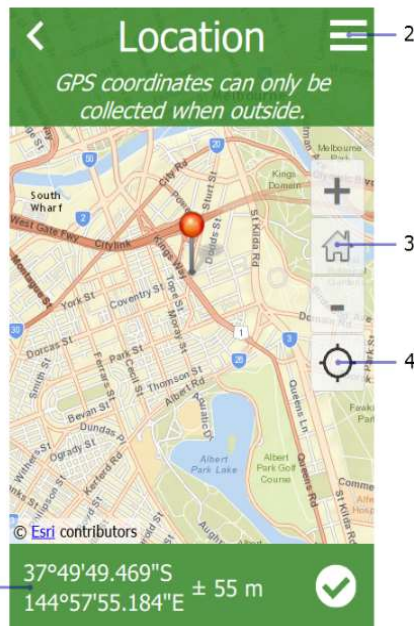
**Make sure you are standing in the correct place in relation to the plot when you record this. See notes below.**

### **Note:** Geopoint questions


Geopoint questions have two forms of presentation. Initially, they are represented by a location panel on the form. When you press the location panel, it expands into a full-screen map with additional locating functions. You can capture a point on either the location panel or the full-screen map.





The Location Averaging button  at the top right of the location panel captures an average of locations rather than a single result when it's pressed. This can also be used with an accuracy threshold to ensure only reliable results can be used. When you tap the location panel, it expands to a full-screen map.



The latitude and longitude of your current location are listed here. Selecting the area converts them into editable fields, allowing you to define a different location.



The Menu button  provides a number of alternative basemaps to the default, for a range of different purposes.

Home  returns the map marker to where the survey creator has defined a home location. If no home location has been defined, it instead returns the marker to the user's location.

The Location icon  starts displayed in black, indicating the location sensor is disabled.

Select the button to switch to Navigation mode, enabling Location and tracking the device's current location. Moving the map

marker from here, either directly on the map or by changing the coordinates, still changes the location and coordinates of the answer, but the device's location remains visible as a pulsing blue dot while doing so. When this happens, the button switches to

an Active Location icon ; select it to return to Navigation .

### Plot relocation

If the plot you are recording is a new plot sampling a hedge under AES option - some of the options will not apply. For this, record New Plot (New feature)

**Plot Recorded** [Found, Not Found, New Plot (Replacement for unfound plot), New Plot (New feature/Land cover), Not appropriate, Access Denied, Too Dangerous]. **IMPORTANT NOTE: If you go back to this field after recording and change to Not Found (or other unrecorded field) all your data will be deleted.**

**NB:** Choosing 'Found' means you are telling us that you are happy that the location of the plot is close enough to the location in previous surveys that the data recorded can be

*considered as a snapshot of the vegetation in that same location but at the present time.*

*Choose 'Not appropriate' for example if you do not record the vegetation or attempt to record the vegetation but then abandon recording because the plot cannot be effectively censused. This would occur if the plot had just been mown, burnt or was under water.*

*Please indicate the kind of disturbance responsible in the Notes box for the plot.*

#### **Notes on plot relocation**

If a previous plot position cannot be found satisfactorily using previous maps and photos, the plot should be recorded as 'Not found'

*If you feel the plot can be considered to be in the same location as previous then select 'Found' from Plot Recorded. This is a really important decision that you have to make, yet it is hard to give guidance for every circumstance - do the best you can. If you think there is high probability that the difference between the previous location and the location in this survey will lead to marked differences in species composition then select 'Not found' and create a replacement plot.*

#### **Relocate plot if:**

- The plot cannot be found satisfactorily from the information given
- The plot is lost due to building/major landscape changes

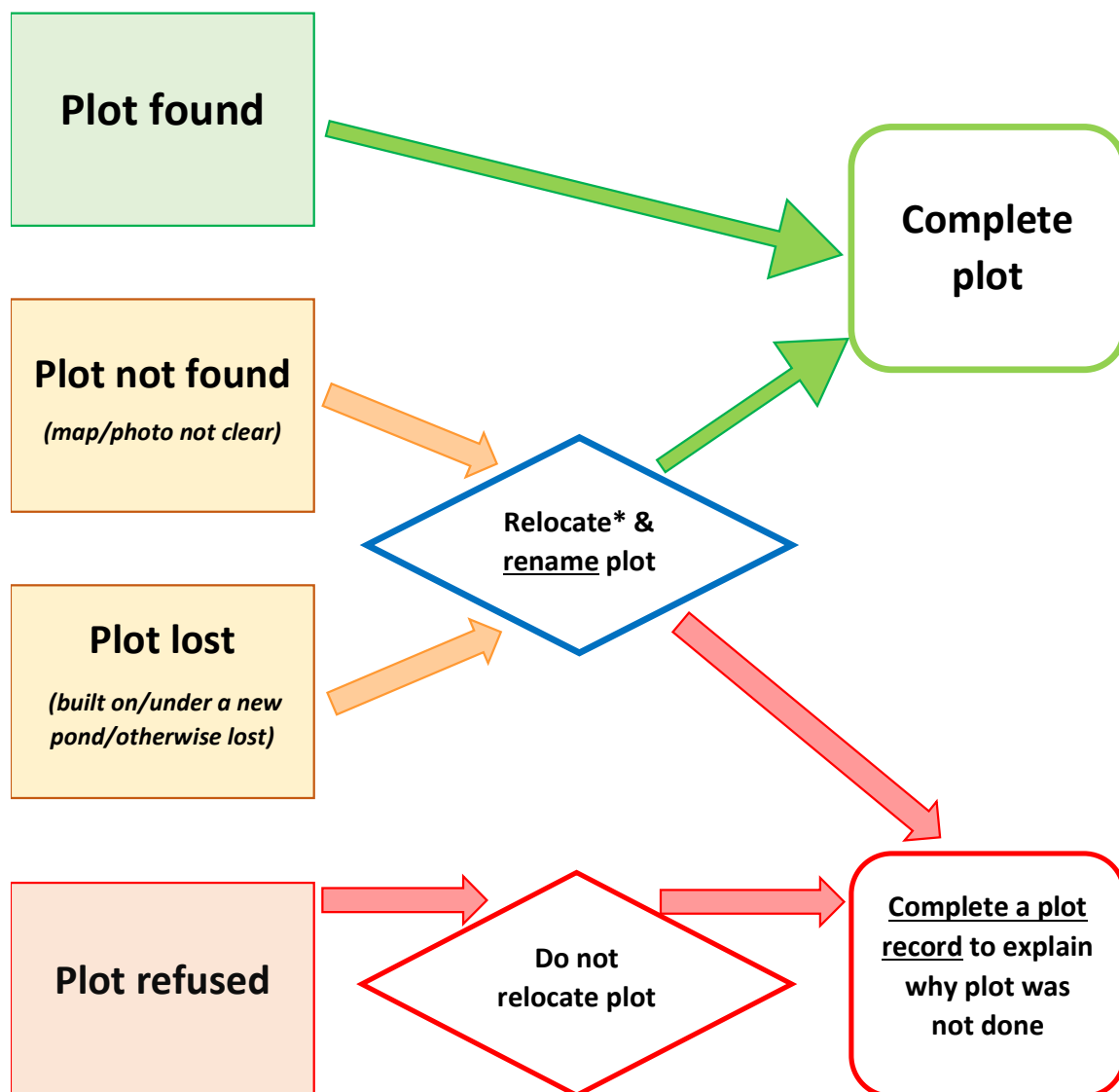
#### **Do not relocate plot if:**

- A plot has been refused access
- Plot is disturbed (record as best you can and note the disturbance)
- Plot is no longer appropriate (i.e. Arable margin plot – margin may no longer exist)

**Plot ID of unfound plot** – Rep ID of plot that has been replaced when plot not found.

**Plate found?** Tick yes if you have found the metal plate. With minimum disturbance please dig down and make sure that it is the metal plate you have found and not rubbish. The knife in the soil coring kit is good for this purpose. **Metal plates were only buried in Countryside Survey squares** (and are sometimes hard to find).

### Rules for plot relocation



***\*Check which land has access permission***

### **Broad and Priority Habitats**

For each plot you need to record the Broad or Priority habitat for the plot and the wider polygon. If you click on a Broad Habitat that has priority habitat options these will appear as additional options.

▼ Plot description

Broad Habitat (plot) \*

Broadleaved Mixed and Yew Woodland

Priority Habitat (plot) \*

Lowland Beech and Yew Woodland

Broad Habitat (wider polygon) \*

Broadleaved Mixed and Yew Woodland

Priority Habitat (wider polygon) \*

☐ Lowland Beech and Yew Woodland  
☐ Upland Mixed Ashwood  
☐ Wet Woodland  
☐ Upland Oakwood  
☐ Lowland Mixed Deciduous

Trees present

☐ Yes

- **Broad habitat (at plot)** - The BH selected in the dropdown for plots should, for this survey, always be 'Boundary & Linear Features'.

- **Broad habitat (wider polygon)** - The BH selected in this dropdown should reflect the habitat in the adjacent field or it could be the habitat in a wide field margin if present.

- **Priority Habitat (wider polygon):** List of PH options, or none. Surveyors are asked to record the specific Priority Habitat for the wider polygon (or 'minimum mappable unit') (or 'none' if the habitat is not a PH). Priority Habitat names or 'Not priority habitat' should be selected from the drop-down list..

In order to classify the Broad (and Priority) Habitats, you will be provided with a vegetation key (Appendix 2) and also habitat data collected during the previous survey. This information can be used to guide your choice of habitat. You should err on the conservative side so use the same allocation as previously unless it

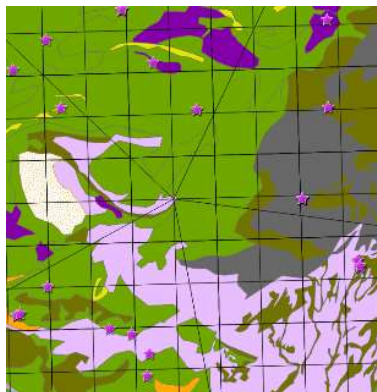
appears that real change has occurred (or unless you think that there was a major error in classification).



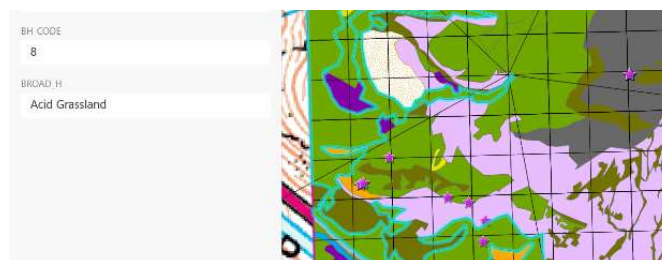
In order to view the Broad and Priority Habitat data you can turn on a layer in Collector (your map of Veg Plots).

- Click on the 3 dots (top right) and choose 'Map Contents'
- In the layers, make sure the layer containing 'BH' is turned on (ticked).

This gives you a coloured map of habitats in your square:



- To select information about a particular polygon, click on the polygon in question. On the left, several selected items may appear
- Click on the **habitat** choice to bring up the information about the recorded habitat in the selected polygon, as below:



- **Tree disease.** If the box 'Trees present' is checked then choose either 'Dead trees' or 'Signs of tree disease' as applicable.



### *Updating existing plot maps*

Surveyors will have been provided with plot sketch maps for all squares which have previously been surveyed.

- Where surveyors are repeating a plot and the map provided is adequate, this should be recorded in the Vegplots software by answering NO to the Plot Map drawn entry and no further action taken.
- Where the surveyors considers a map to be inadequate (e.g. missing an essential feature) or where something has changed in the landscape since the previous map was drawn they may want to edit or redraw the map they have been provided with. If this is the case it should be indicated in the Vegplots software by answering Edited or Redrawn

***Training will be provided regarding the drawing of sketch maps***



## 7.5 Plot Specific Header Information (Page 2)

This page contains a range of information which is required for the different plot types. The surveyors will only be able to enter data relevant to the plot type being surveyed. *The header information relevant to the different plot types is detailed under each plot type, as described in section 5.*

## 7.6 Entering Species (Page 3)

- Comprehensive species lists are provided in each drop-down box – ‘auto-type’ is enabled in these boxes to allow for ease of data entry.

If the species is not listed, start typing ‘Other’, select ‘Other’ and a free-text box will appear in which you can type the species. This may also be used to enter unknown species, for example ‘Species A’, ‘Species B’ and so on (*once the species has been identified, this should be replaced with the correct species*). Plants which cannot be immediately identified, or for which a subsequent check, in a flora or herbarium, is required, can be placed in a labelled paper bag, or alternatively, an option is also provided to take a photo of unknown species at the bottom of the page for later identification.


Additional species are entered by clicking the  (below 'Total Cover'), or can be deleted using the dustbin icon. .

If a species is selected, and subsequently needs to be changed, click the small x at the side of the species to delete, and the drop down options will reappear.



Having completed the record of presence of the plants in the relevant nest, an estimate of cover abundance for the nest should be made. This should include all vascular plants plus tree/shrub seedlings recorded as present, plus the six additional categories (**litter, wood, rock, bare ground, water and bryophytes**). **Estimates should be given to the nearest 5% only or 'present'**. The total cover should add up to ca. 100% (making due allowance for the 'presents'), **or can be much more if the ground flora is markedly layered**. For example a H plot with a shrub layer and an understorey is likely to exceed 100%!

Cover estimates can be entered as species are entered, or can be entered subsequently

using the scroll forward and back buttons. .

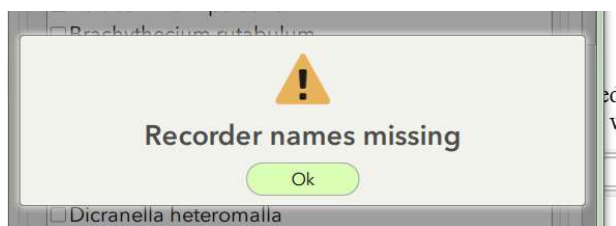
Unfortunately, it is currently not possible to view the species entered as a list. However, as a helpful guide, species are summarised at the bottom of the page, along with a sum of the covers entered.

*Note: the software currently allows blank species or cover boxes, as well as duplicate species. **PLEASE CHECK** carefully that this does not occur in your plot by checking the summary at the bottom of the page.*

'Bare ground' does not include leaf litter and rock. All vascular plants should be recorded, together with a restricted list of bryophytes and lichens (see Section 6). **Mosses and lichens growing on rocks and trees should be ignored.**

### Completing Plots

The software will check that certain fields are filled in. If something is missing, you will get a reminder before submitting, for example:



## 7.7 Recording H plots

### HEADER

- **Distance of crop from centre of hedge :** Not Applicable, <2m, 2-4m, 4-6m, 6-12m , 12-20m. Note that this refers to cultivated land not to established grassland. The idea is to capture ploughing too close to the hedge base. Distance is from the mid-line of the hedge.
- **Tree disease.** Dead trees. Disease present (need to click trees present to get these options).

### LISTED SPECIES

Species presence and cover will be recorded

## 7.8 Recording D plots

D plots may be placed on hedgerows or lines of trees or on linear features which comprise both.

### HEADER

Trees are defined as species that can persist as constituents of a woodland canopy. So, for example, woody species that can be ultimately overtopped by another species when growing in woodland or those that rarely grow in woodland, are considered shrubs. Hazel is an exception and is considered a tree for the purposes of D plot recording. Willows are considered trees because they can be the dominant in wet woodland. Shrubs therefore comprise; *Prunus* spp., Hawthorn, *Viburnum* spp., Juniper, *Ulex* spp., *Rhamnus catharticus*, and all other woody species which are ultimately successional replaced as scrub becomes woodland. Hence the maximum height of a shrub will be shorter than that of the tree species that can replace it.

Survey123 for ArcGIS

**Plot Information**

**Plot Specific headers**

Rep ID  
100D1

▼ **D plots**

Modal Feature Height \*

Modal Feature Width \*

Vertical gappiness \*

Are there gaps >5m? \*

Distance of adjacent managed or ploughed land from end of WLF?

Are there trees that take their natural shape? \*

Are trees and shrubs: \*

There is a **LOT** of D plot information. These plots provide a lot of information on which condition of **WLF's** is assessed:

- **Tree disease.** Dead trees. Disease present.
- **Modal Feature height** (excluding earth banks, see illustrations for measuring asymmetric **WLF** heights) (modal height is the average for most of the length of the feature rather than an average between the tallest and shortest part of a feature): <1m, 1-1.5m, 1.5-2m, 2-2.5, 2.5-3m, 3-4m, 4-6m, 6-15m, >15m
- **Feature width** : <1m, 1-1.5m, 1.5-2m, 2-2.5, 2.5-3m, 3-4m, 4-5m, 5-10m, >10m
- **Vertical Gappiness** % gappiness: none, <10%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%
- **Are there gaps >5m:** Yes, No
- **Distance of adjacent managed or ploughed land from midline of the WLF:** Not Applicable, <2m, 2-4m, 4-6m, 6-12m, 12-20m
- **Are there trees that take their natural shape?** : Yes (forming a separate layer above a shrubby WLF), Yes (but there is no separate shrubby layer), No. Note that natural shape means devoid of any apparent trimming or pruning anywhere from the base to the crown.
- **Are trees and shrubs?** - Uniform in height, Different heights. If the trees and shrubs form two or more obvious strata then they are of 'different heights'. If all intermixed and variable but forming a single mixed canopy then answer 'uniform in height'.
- **Width perennial vegetation:** <1m, >1m, Not Applicable. This question refers to the width of any herbaceous strip of vegetation next to the WLF. Hence, if it is just an adjacent grassland then it would probably be >2m. If next to cultivated ground it may well be less.
- **If trees present are the tree or shrub canopies touching?** : Not at all, Partially, Mostly, Completely, Not applicable. This question refers to the extent to which the tree layer is gappy or whether it is continuous; either as a largely uninterrupted tree canopy or tree and shrub canopy.

- **Height of base of canopy** : <0.5m, 0.5-1m, 1-2m, >2m
- **Are there any signs of historic management?** (e.g. layered base, old coppice stools, slanting main stems with large vertical branches. Yes, No. Historic management really refers to impacts that happened >10 years ago. However, this will be difficult to determine with certainty so apply your best judgement.

#### D Plot: Invasive Species Presence/Cover

- ***Leylandii***: <10% , >10%
- ***Fallopia japonica***: <10% , >10%
- ***Crocasmia aurea* hybrid (Montbretia)**: <10% , >10%
- ***Fallopia sachalinensis***: <10% , >10%
- ***Fallopia x bohemica***: <10% , >10%
- ***Fallopia baldschuanica***: <10% , >10%
- ***Heracleum mantegazzianum***: <10% , >10%
- ***Impatiens glandulifera***: <10% , >10%
- ***Petasites albus***: <10% , >10%
- ***Petasites fragrans***: <10% , >10%

The screenshot shows the 'Plot Information' form in Survey123 for ArcGIS. The form is titled 'Plot Information' and has a green header bar. It contains several sections with dropdown menus and radio button options. The 'Invasive Species' section is expanded, showing a list of species with radio button options for cover percentage.

**Width perennial vegetation \***

**Are the trees or shrub canopies touching? \***

**Height of base of canopy \***

**Are there signs of historic management? \***  
☐ Yes  
☐ No

**▼ Invasive Species \***

**Crocasmia aurea hybrid \***  
☐ <10% ☐ >10%

**Fallopia japonica \***  
☐ <10% ☐ >10%

**Fallopia sachalinensis \***  
☐ <10% ☐ >10%

**Fallopia x bohemica \***  
☐ <10% ☐ >10%

**Fallopia baldschuanica \***  
☐ <10% ☐ >10%

**Heracleum mantegazzianum \***  
☐ <10% ☐ >10%

**Impatiens glandulifera \***  
☐ <10% ☐ >10%

**Leylandii \***  
☐ <10% ☐ >10%

**Petasites albus \***  
☐ <10% ☐ >10%

**Petasites fragrans \***  
☐ <10% ☐ >10%

#### LISTED SPECIES

Woody species presence and cover only (not including gaps) are recorded. This includes woody climbing species such as *Rosa spp.*, *Rubus fruticosus* and *Clematis vitalba*. Also include trees that maybe vertically shading the plot. List these and include a cover value. Note that when considering shade categories for D plots it is the main components of the WLF that would be subject to shade from a separate layer of overtopping trees. Hence if the WLF is not separable into an obvious shrub and tree layer then the WLF will **not** be shaded.

Rep ID  
100D2


▼ Vegetation Plot

▼ Nest 1 (include X plot 0). Enter species:


Species:

Carex acuta

Total Cover

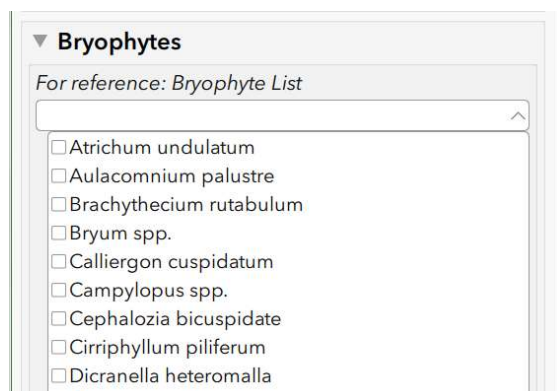


1 of 1



## 7.9 Bryophytes and Lichens

Only the bryophytes and lichens listed (mosses only) and on the Vegplots list (lichens, liverworts and mosses), should be recorded (with their individual cover values). **No other bryophytes or lichens should be recorded.**



▼ **Bryophytes**

For reference: *Bryophyte List*

☐ Atrichum undulatum

☐ Aulacomnium palustre

☐ Brachythecium rutabulum

☐ Bryum spp.

☐ Calliergon cuspidatum

☐ Campylopus spp.

☐ Cephalozia bicuspidate

☐ Cirriphyllum piliferum

☐ Dicranella heteromalla

Note that **surveyors should put maximum effort into recording vascular plants - especially sedges and grasses - accurately and completely rather than spend effort on identifying bryophytes.** Even if you record those listed below, this will often only represent part of the total. Hence attach the highest priority to recording 'Total bryophyte' and cover of the coarse *Sphagnum* categories. Note that the nomenclature below will be updated in the next version of the handbook. Older surveyors will recognize the names!

No	Species	Compare with
1	<i>Atrichum undulatum</i>	<i>Plagiomnium undulatum</i>
2	<i>Aulacomnium palustre</i>	6,7
3	<i>Brachythecium albicans</i>	4, 5, 20
4	<i>Brachythecium rivulare</i>	3, 5, 20, <i>Brachythecium plumosum</i>
5	<i>Brachythecium rutabulum</i>	3, 4, 20
6	<i>Breutelia chrysoscoma</i>	2,7
7	<i>Bryum pseudotriquetrum</i>	2,6
8	<i>Calliergon (Calliergonella) cuspidatum</i>	9
9	<i>Calliergon giganteum</i>	8, <i>Calliergon cordifolium</i>
10	<i>Campylium stellatum</i>	-
11	<i>Campylopus introflexus</i>	<i>Campylopus atrovirens</i> , <i>Grimmia</i> sp.
12	<i>Campylopus</i> sp.	16, 18
13	<i>Climacium dendroides</i>	52
14	<i>Cratoneuron (Palustriella) commutatum</i>	<i>Cratoneuron filicinum</i>
15	<i>Ctenidium molluscum</i>	-
16	<i>Dicranella heteromalla</i>	12, 19
17	<i>Dicranum majus</i>	19
18	<i>Dicranum scoparium</i>	12, 16, 17
19	<i>Drepanocladus aduncus</i> Only in swamps, not flushes	47, <i>Drepanocladus revolvens</i> , <i>D. cossonii</i> , <i>Warnstorfia fluitans</i> , <i>W. exannulata</i>
20	<i>Eurhynchium</i> spp.	3, 4, 5
21	<i>Fissidens</i> sp.	37
22	<i>Fontinalis antipyretica</i>	<i>Fontinalis squamosa</i>
23	<i>Hedwigia stellata</i>	42
24	<i>Homalothecium lutescens</i>	25
25	<i>Homalothecium sericeum</i>	24
26	<i>Hookeria lucens</i>	-
27	<i>Hylocomium splendens</i>	53
28	<i>Hypnum cupressiforme</i>	29, 47
29	<i>Hypnum jutlandicum</i>	28
30	<i>Leucobryum glaucum</i>	<i>Sphagnum</i> spp.
31	<i>Mnium hornum</i>	7
32	<i>Neckera crispa</i>	-
33	<i>Pellia</i> spp.	<i>Riccardia</i> spp.
34	<i>Philonotis fontana</i>	-
35	<i>Plagiothecium</i> sp.	22
36	<i>Plagiothecium undulatum</i>	-
37	<i>Pleurozium schreberi</i>	40
38	<i>Polytrichum commune</i>	<i>Polytrichum formosum</i>
39	<i>Polytrichum juniperinum</i>	<i>Polytrichum piliferum</i>
40	<i>Pseudoscleropodium (Scleropodium) purum</i>	37
41	<i>Ptilidium ciliare</i>	-
42	<i>Racomitrium lanuginosum</i>	23
43	<i>Rhizomnium punctatum/pseudopunctatum</i>	31, <i>Plagiomnium</i> spp.
44	<i>Rhytidiadelphus loreus</i>	45, 46
45	<i>Rhytidiadelphus squarrosus</i>	44, 46
46	<i>Rhytidiadelphus triquetrus</i>	44, 45
47	<i>Scorpidium scorpioides</i>	19
48	<i>Sphagnum green/fat</i>	-
49	<i>Sphagnum green/thin</i>	-
50	<i>Sphagnum red/fat</i>	-
51	<i>Sphagnum red/thin</i>	-
52	<i>Thamnobryum alopecurum</i>	13
53	<i>Thuidium tamariscinum</i>	27



## 7.10 Submitting your data.

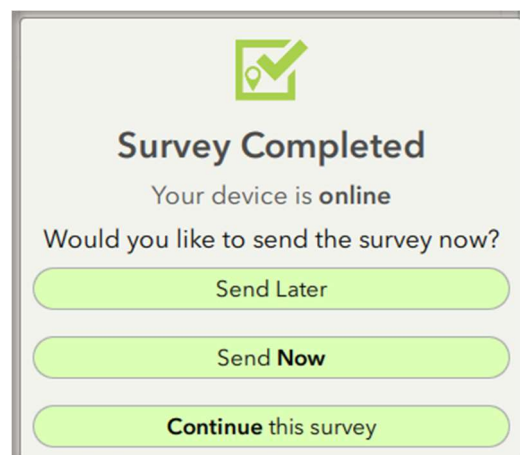
Once a survey form has been completed, you have a number of options on clicking the green tick button on the last page of your survey. If you are online



(either WiFi or mobile data) and you are happy your survey is fully complete, you can submit your data directly to the central database using the 'Send Now' option (note: it is possible to resend a survey if you find you have missed something – you will find your sent surveys in the 'Sent' box. **You must choose the 'Copy to new survey' option** otherwise you will find you can't edit certain fields. If you are resending, **please make a note in the notes section** to say which the correct version is).

If you are offline, return halfway through a survey or choose 'Send Later', your survey will automatically be saved in the 'Drafts' or 'Outbox' from where you can reopen your survey and continue editing.

*If your devices crashes at any point, Survey123 has auto save, so it is likely that if you are halfway through a survey, you should not have lost anything.*





### 7.3. Plot photos & Sketch Maps

#### 7.4. Plot Photo Protocol

Surveyors are asked to take photos of each plot location. This can be done easily using the tablet camera accessible via the plot recording application. Two or three photos will usually suffice – please don't overdo it. These photos will primarily be used to help surveyors find the same plot locations in the next survey. However the photos have also proved useful for illustrating vegetation change over time. Since the principal aim of the photos is to aid finding the plot, the most useful photos depict the plot in relation to a nearby feature that is unlikely to move in four years and is unique and obvious, for example, a prominent rock, tree or fence post. It is essential that all plot photos feature information on plot number and type, **this should be automatically stamped on the photo if taken using the Survey123 app.**

*(As an alternative, surveyors are supplied with a set of letters and numbers on waterproof paper which can be attached to the back of a weatherwriter to indicate the number and type of plot featured in the photo as well as the square number. From the evidence of previous surveys, the most useful plot photos show the surveyor holding the weather writer vertically behind or to the side of a plot (at plot location marker) NOT facing the sun (which can cause glare and make it impossible to decipher the plot type and number) or including too much sky).*

As surveyors will be using the tablet digital cameras it will be possible to check the quality of the photo and take another if the one taken is inadequate. Also indicate the direction of the photo taken on the plot sketch map (do not label these as 'P1', 'P2' as this could be confused with 'P' plots).

**Ensure that the following are clearly visible in each photo:**

- Square number
- Clear plot type and number
- Distinguishing features where possible

### Plot Sketch Map Protocol

Accurate and clear plot sketch maps will enable plots to be refound in subsequent surveys. The plot sketch maps are therefore vital and you will be relying on previous maps to help you locate the plot locations. When drawing new maps please make them as clear and precise as possible using the measuring tape, rangefinder and compass. **Ensure that the point at which the differential GPS reading was taken is also clearly marked.** The maps need not be works of art but they do need to be useable. You will know from your own experience of using plot maps drawn by others what is and is not useful. Try to be as helpful as possible in upland situations where reference points may be scarce. In such situations, surveyors have often taken back bearings from reasonably distant features on the skyline. This is completely acceptable. The possibility of misty conditions next survey is no reason not to record them but also do not use distant features as a substitute for measuring to nearby reference points.

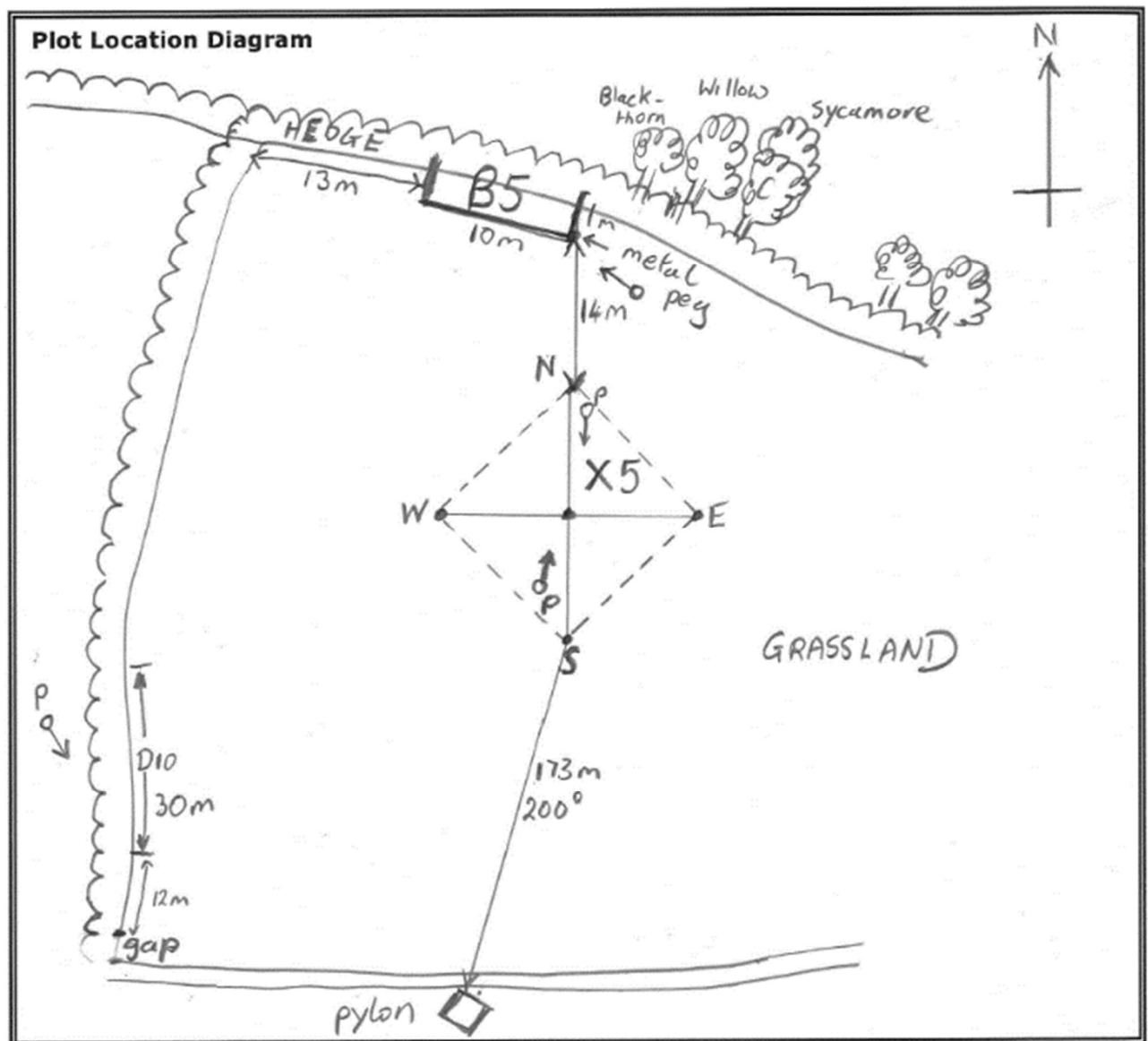
Also note that if you have no rangefinder and you have to pace then translate your paces into metres. Measure your pace to determine whether one long stride really is 1m or whether two ordinary paces combine to more accurately give a metre. Writing distances in metres is always to be preferred.

If necessary, a sketch of the plot location should be drawn on the tablet or one of the waterproof A4 sheets provided (training will be given for this). The map should clearly define plot location using measured distances and compass bearings to nearby reference features. If surveyors run out of map recording sheets they should record maps on blank sheets.

#### **Ensure that maps include:**

- Square number
- Plot type and number
- Date and surveyors initials
- North arrow

Having successfully refound a plot using sketch map and photos you may often find that is in a different position to that indicated by the point on the plot map layer. This is because GPS may not have been used to stamp the plot in the previous survey and so the plot point is an approximation.



**Example of a plot location diagram**

## Appendix 1 - Collector & Survey123

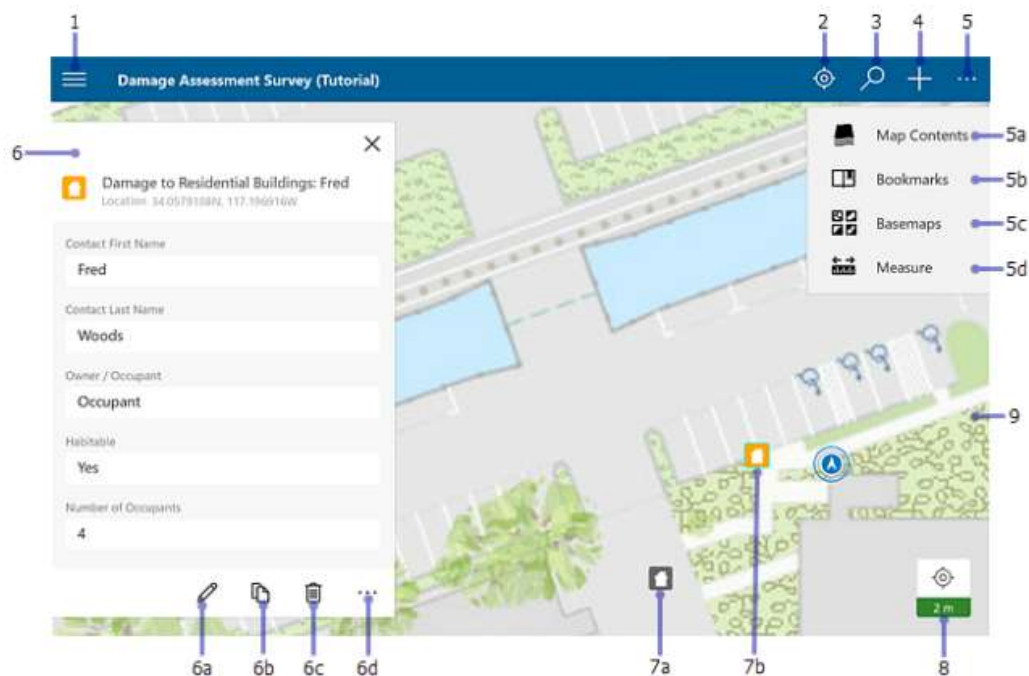
### Collector – Generic Notes

The main parts of the app are as follows:




- [Map](#)
- [Collect screen](#)
- [Map Gallery](#)
- [Menu](#)

#### Map


The majority of your time in the app is spent interacting with the map, where a basemap and features display. This is the active open map used in your data collection. When viewing the map, you can collect data, begin measuring, and initiate all the other capabilities of the app. Use the Map Gallery to open a map.



The following are highlighted in the previous image of the map:

1. **Menu**—Expands the menu to display collections of maps and provides access to accounts and app settings.
2. **My Location** tool—Uses GPS to show your location on the map. To enable **My Location**, turn on location services in your device's settings. The icon changes to show the state of the GPS. The icon  indicates your location does not display on the map. Once your location is turned on, the icon  indicates your location displays on the map and is kept centred. As you move, the map moves on the screen to keep your location centred on the screen. Once you pan the map while your location displays, the icon  indicates your location displays on the map but isn't kept centred. As you move, your location displayed on the map moves on the screen and can even move outside of the visible part of the map.

#### **Tip:**

When you don't need to see your location on the map, turn off **My Location** . This saves the battery by turning off not only the display of your location but also the GPS. If the map [tracks your location](#), it continues to do so when location is not displayed on the map, turning on the GPS when needed. If you're collecting data, the GPS turns back on as needed to get collection locations.

3. **Search** tool—Searches for a place-name, address, coordinate location, or feature. The map author configures the search and the hint text, which provides information about what you can search.
4. **Collect New** tool—Adds a feature.
5. **More**—Shows a menu of the additional tools available. The screen capture shows the menu.
1. **Map Contents** tool—Shows the legend and layers. If you turn layers on and off on the **Layers** tab, these changes are reflected in the legend. While this changes which features display on the map, it doesn't change the saved map or how the map appears to others.
2. **Bookmarks** tool—Goes to previously defined areas of interest. These include **Bookmarks** defined on the map and **My Places** that you've stored in your device.
3. **Basemaps** tool—Changes the basemap to another one that is either online or on your device. The basemap, also known as a reference or background map, provides the information displayed under the interactive features.

**Note:**

*The map author can disable the ability to switch basemaps.*

4. **Measure** tool—Draws lines and shapes on the map, and calculates their lengths and areas in a variety of measurement units.

**Note:**

*The map author can disable the ability to measure. This is done with the map in measure mode, presenting a different set of tools and different behaviour. While viewing an open map, interacting with the map highlights features and presents information about them. In measure mode, interacting with the map adds vertices and updates the measurement.*

6. **Panel**—Displays contextual information based on the tools being used and the interactions with the map. The possible contents include types for data collection, searches and search results, feature lists and feature details, and editable feature details. When displaying a list of search results or features, the selected item is highlighted on the map. Select a result or use **More** • • • to interact with the result.

The screen capture shows the panel with the details of a feature. While feature details are displayed, the following tools are available:

1. **Edit**—Starts editing the feature.
2. **Copy**—Copies the feature to create a new feature.

**Note:**

A feature can only be copied if it's editable. Copying is disabled on features that are the children in a relationship.

3. **Delete**—Deletes the feature.
4. **More**—Provides access to the **Zoom to** and **Add to my places** actions if applicable to the selected feature.



7. (a and b) **Features**—Each feature (here a house) is an interactive piece of data on the map. As you work, you add, update, and delete features. When selected, the feature is highlighted on the map, as in the case of the feature marked b. They have additional information—including, in some cases, attachments—that can be viewed by selecting the feature to display its details in the **panel**.

**Note:**


*In this help system, the word feature refers to an item of interest on the map with which you can interact. The traditional meaning of a feature on a map refers to any item of interest. However, in this app, some of the traditional features are part of the basemap (background) and are not interactive. For example, in the Damage Assessment Survey (Tutorial) sample map, the cities and lakes are a part of the basemap and do not have additional information or interactivity. Any houses are items on top of the basemap, and they have additional information with which you can interact. You can view information about and edit the houses, so the houses in that map are features.*

8. **Location Accuracy**—Indicates current horizontal GPS accuracy as well as whether it is below the location accuracy threshold. For details, see [How do I know the accuracy of the GPS positions I'm getting?](#) in the Collect Data [Troubleshooting](#) topic. To display more information about your current GPS location, such as vertical accuracy and fix type, select the badge.
9. **Map**—The map appears here, including a basemap and features. You can pan, zoom in, and zoom out to see other areas.

***My GPS locations are not being updated on the map, and after I select the location accuracy badge, it shows that it's taking increasingly longer to calculate a fix time. Why is this happening and how do I fix it?***

*The time on your Windows 10 device might be ahead. Collector calculates fix time by determining the difference between the time on your GPS receiver and the time on your Windows device. If the time on your Windows 10 device is ahead, Collector assumes that your GPS positions are invalid and discards them. To fix this, synchronize the time on your device with the time on the Internet.*

***How do I know the accuracy of the GPS positions I'm getting?***

When you have a map open and **My Location**  is on, displaying your location on the map, the **Location Accuracy** badge displays in the lower right corner of the map.



*This indicates current horizontal accuracy as well as whether the current accuracy is below the location accuracy threshold required to use the GPS to collect data. If the horizontal accuracy is valid for data collection, the badge is green; if the accuracy is not good enough to use the GPS for data collection, the badge is red. If no positions have been received, dashes appear in the badge where the accuracy is supposed to display. If you are not receiving any position information and are using an external GPS receiver, first verify that your receiver is turned on and connected to Collector.*

***How can I get more information about my current GPS location?***

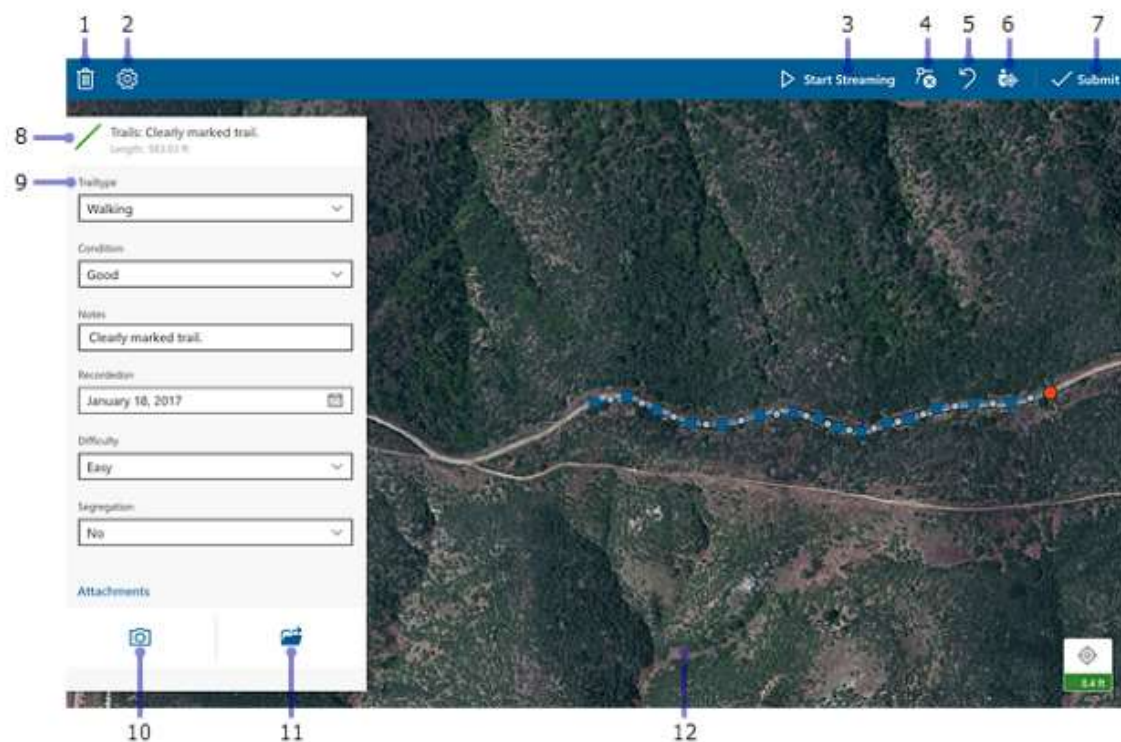
*If you have a GPS location and want to see the details of that position, select the **Location Accuracy** badge in the lower right corner of the map to*



display information such as the time that the position was received, vertical accuracy, and fix type.

### Collect screen

This screen displays when you are collecting a new feature or editing the attributes of an existing feature. Use it to enter and save information about a feature, including attributes and attachments, as well as to set the feature's location. The collect screen also provides access to the location accuracy, streaming interval, and collection mode settings.



The following items are highlighted on the previous image of the Collect screen:

**Delete**—Provides options to discard the feature if you are collecting a new feature, discard your edits if you are editing an existing feature, or discard the shape of the feature if you are working with a line or polygon.

**Collect Settings**—Provides access to view and update location accuracy, streaming interval, and collection mode.

**Start Streaming**—Automatically collects a shape using your device's GPS, allowing you to walk or drive along a feature and capture its shape without manually placing points. When selected, it changes to Pause Streaming, and you can't manually edit the shape. To make manual edits, pause streaming, make your updates, and restart streaming. You can only stream when collecting or editing a polygon or line.

**Delete Vertex**—Deletes the currently active vertex of your polygon or line feature. It only displays when you are collecting or editing a polygon or line feature.

**Undo**—Reverts the last change you made to the shape of a feature. For example, if you update the location of a feature or add a point to a shape you're drawing, selecting Undo discards these changes. However, if you edit a field in the Attributes list and select Undo, your field edits are unaffected and the last change made to the feature's shape is undone.

**Use My Location**—Updates the feature's location or adds a new vertex using the GPS.

**Submit**—Saves the feature and the data you collected about it.

**Feature type**—Indicates the type of feature you are collecting.

**Fields**—Enter information about the feature in each of the fields shown.

**Camera**—Take and add a new photo or video to a feature collection using the device's



camera if attachments are enabled in the map.

**Browse**—Attach to a feature collection an existing item from the device, such as a photo, video, PDF file, or text document if attachments are enabled in the map.

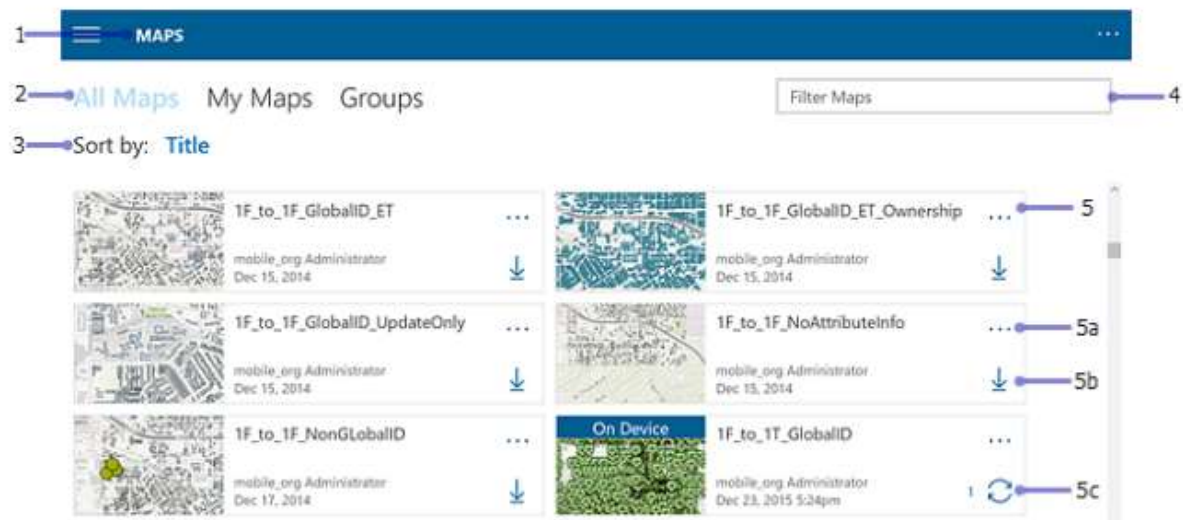
**Map**—Allows you to create and edit the feature's shape. For details on working with the shape of features, see Draw a shape.

## Map Gallery

Use the Map Gallery to open, find, or manage maps. It displays lists of maps including both the collections from the menu and the maps of a group.

To go to the Map Gallery when viewing a map, select Menu and select a collection of maps.

To change the collection of maps displayed, use the menu or select a group. To return to the open map, select the map's thumbnail at the top of the menu.







The following items are highlighted on the previous image of the Map Gallery:

1. **Gallery title**—Describes the list of maps.
2. **Tabs**—Displays the selected category of maps. When viewing **Maps**, it has the following options:
  - **All Maps** (as shown in the image)—Shows all available maps, including those you authored and those available to groups of which you are a member.
  - **My Maps**—Shows all the maps you authored. They are shown as a flat list, ignoring any folders that you have set up.
  - **Groups**—Shows the groups of which you are a member. Choose a group to show the maps shared with that group.


When viewing the On Device collection, **Maps** shows maps downloaded to your device, and **Basemaps** allows you to manage your basemaps.

3. **Sort by**—Allows you to sort maps by title, date, or owner.
4. **Filter Maps**—Filters the available maps to only display those maps with matching title, summary, or tags.
5. **Map Card**—An available map. Select the map card to open a map.
  1. **More**—Provides access to additional actions you can take with the map. These depend on the chosen map and can include **Details**, **Download**, **Sync**, and **Remove**. In the map's details, you

- can open the map , add the map to your favourites by choosing the star , and download the map  if that option is available.
2. **Download**—Starts downloading your map. **Download** is only visible if the map can be taken offline.
  3. **Sync**—Syncs the data with the server. This only displays on downloaded maps. A count of unsynced edits displays beside **Sync** .



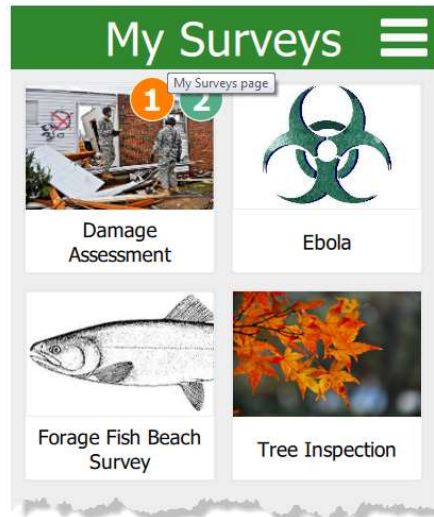
The following items are highlighted on the previous image of the menu:

1. **Maps**—Displays **All Maps**, **My Maps**, and **Groups**.
2. **Favourites**—Displays your favourite maps. To make a map a favourite, select **More** ... on the map's card, select **Details**, and select **Favorite** .
3. **Recents**—Displays the maps recently used by the current account and on this device.
4. **On Device**—Displays the maps and basemaps you've downloaded to your device.
5. **Account**—Provides access to add, remove, or switch user accounts.
6. **Settings**—Provides access to view and update the app settings, such as location accuracy, streaming interval, collection mode, and measurement units. It also provides access to information about the licensing of the app.


## **Survey123 - Generic Notes**

### *My Surveys*

When starting the Survey123 field app and signing in with your ArcGIS organizational account, the app opens to the My Surveys page. This is the table of contents for all of your currently installed surveys, although it will be empty on first launching the app. Note that, once there is a survey downloaded onto your device, you will no longer need to sign in at launch.



To access the menu for a particular form, select its icon. Numbers in the corner of a survey's icon indicate unfinished or unsent results. If one has unfinished draft entries, the number of them will be listed in an orange circle, while the surveys queued to be sent later are numbered in a green circle. If a survey has inbox editing enabled, the amount of downloaded surveys in the inbox are numbered in a blue circle.

Use the Menu  at the upper-right to access the Download Surveys page, sign in with your ArcGIS organizational account, or view settings.

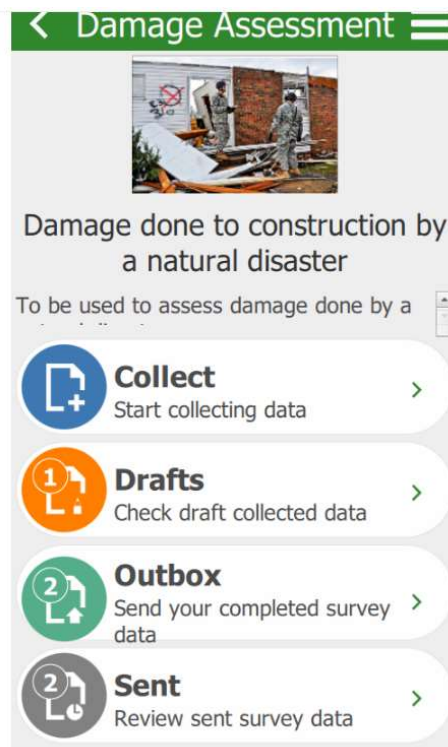
#### *Download Surveys*

On the Download Surveys page, all surveys currently available to your account are listed alphabetically. In the following screen shot, the bottom survey has been downloaded,

evidenced by Download  being replaced by Refresh .

#### *Survey contents*

The survey contents page can be accessed by selecting a survey from My Surveys. Here, you can start collecting new data or access previously collected surveys.




The options on this page are as follows:

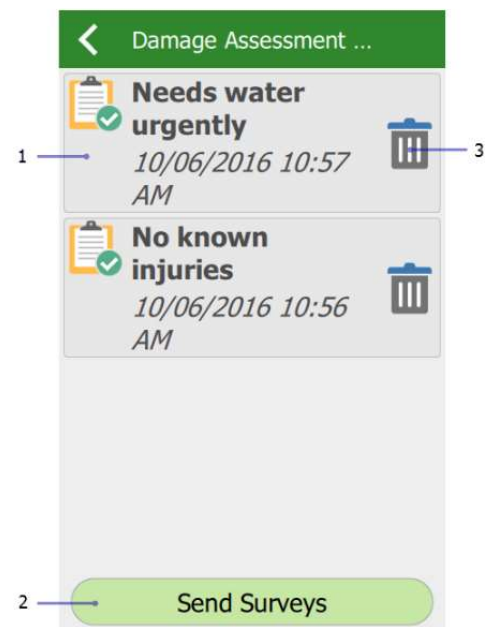
**Collect**—Opens a new, blank survey page for inputting data.

**Drafts**—Opens to a form currently left uncompleted by closing the survey before sending it.

**Outbox**—Opens to a listing of all forms finished but unsent, either by choice or due to the device being offline when submitting.

**Sent**—Contains the records of all forms submitted to the survey's creator.

The Menu  at the upper right contains the options to delete the survey from your device and to download an associated basemap (if this choice is not available, the survey has no basemap associated with it). The Drafts, Outbox, and Sent pages have similar layouts, with standardized buttons and functions. The following screen shot is of the Outbox page, but be aware that all three pages look and behave similarly:



The options on these pages are as follows:

Press the field for the form to reopen it. On the Sent page, this instead opens a copy of the form and its answers. The text in this field defaults to the raw data of the survey. To replace it with something else, see instance names.

The Send Surveys button on the Outbox page submits all forms currently listed within it. This button does not exist on the Sent page; however, the Sent page instead has an Empty Sent Surveys button, which clears the listing of all sent forms. It does not delete the surveys from their destination. There is no equivalent button on the Drafts page.




Delete deletes the form from the device. This button is not present on the Sent page.

### Survey

On the individual survey page, you can fill in the data requested by the survey's creator. Surveys are modular and designed for specific purposes, so the actual layout and presentation will vary from survey to survey. However, the Menu button and its contents remain the same throughout.

### Favourites


To create a set of favourite answers that you can reuse, first complete a survey with your preferred answers, then

open the Menu  and select Set as favourite answers (1a) before submitting it. This saved survey will now be marked with a star icon in the Sent list, and the Paste answers from favourite option (1b) will become visible. This menu option will apply your favourite answers to the current survey automatically.

### Note:

*Favourite answers are saved as a marker on the sent survey, signified by a gold star on their entry on the Sent page. If this survey is deleted from your device, the favourite answers will also be deleted.*

### Settings


Accessed from the Menu  on the app's initial page, Settings contains a number of options and choices to customize the Survey123 field app to your preference.

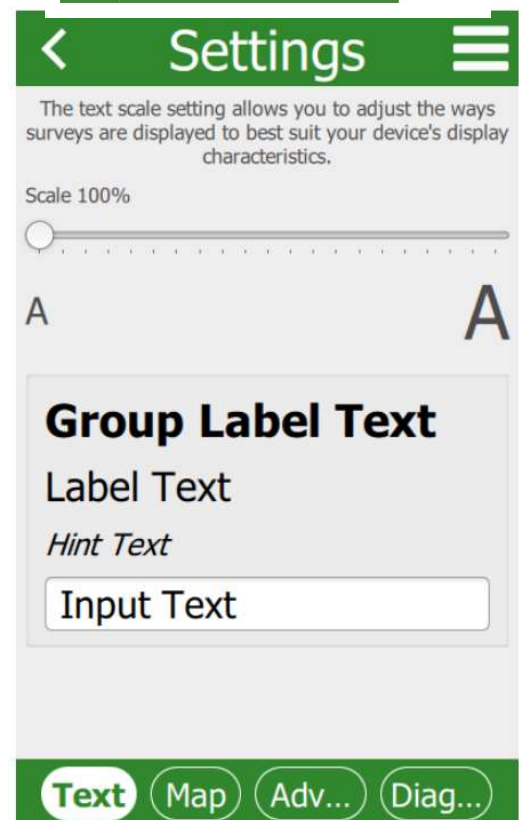
#### Text settings

The slider on the Text tab allows you to alter the scale of text within the app, up to 200 percent of the default. The text preview updates in real time to display the currently selected scale.

#### Map settings

Designate the Map Library Folder, from which the app will pull offline basemaps. The Map Library can be

accessed within the app through the Menu button  in the Settings pages.



### **Advanced Settings**

Reinitialize Database returns the device's survey database to the default; all surveys, complete or incomplete, are deleted, and the submitted surveys list is cleared.

Fix Database fixes the existing entries in the survey database on your device when the folder path for the database has changed. This is required when you update the version of the Survey123 field app on iOS from the App Store. When the app is updated, its location on the device changes. Fixing the database ensures the new folder path is used for existing records. This tool is also useful if you want to copy a database from one device to another to send records. After copying the .sqlite database from one device to another, click Fix Database on the destination device to fix the data paths. For additional details, see Recover data from a mobile device.

Delete Submitted Surveys clears the submitted surveys list for all surveys saved onto the device.

Clear Map Cache deletes the cache of map tiles that surveys have loaded. The button also lists the current size of the cache on the device

## Appendix 2: Habitat key and allocation rules to broad and non-coastal priority habitats (adapted for GMEP)

Simon Smart, Bob Bunce, Rob Large, Pete Carey, Dave Howard, Keith Kirby, Lindsay Maskell  
(Incorporating Suggestions from Stuart Smith, Jim Latham, Clare Burrows, Mark Crick, Ian Strachan, Keith Kirby, Alex Turner and Heather Robertson)

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>1a</b>	Total vegetation cover may be variable but where present consists of over 75% herbaceous species.	<b>2</b>		
<b>1b</b>	Vegetation cover consisting of over 25% canopy cover of trees or shrubs over 1m high.	<b>16</b>		
<b>1c</b>	Vegetation with over 25% cover of dwarf shrubs, less than 1m. Includes dwarf <i>Ulex europaeus</i> , <i>Ulex galii</i> and <i>U. minor</i> , <i>Calluna</i> , <i>Erica</i> spp., <i>Vaccinium</i> spp. <i>Empetrum</i> and <i>Arctostaphylos</i> . Does not include <i>Salix repens</i> in dune slacks.	<b>20</b>		
<b>1d</b>	Saxicolous (on rock) and chasmophytic (in crevices), non-coastal vegetation cover less than 50% with residual cover being <u>rock</u> . Includes species such as <i>Cryptogamma crispa</i> , <i>Cystopteris fragilis</i> , <i>Gymnocarpium robertianum</i> and <i>Asplenium trichomanes</i> . Includes scree, mine spoil and other unvegetated rock surfaces that may be sparsely vegetated- see attribute descriptions.	Inland Rock (BH 16)	<i>Rock vegetation</i>	OV38-40, U16, U17, U21
<b>1e</b>	Unvegetated e.g. sea/other water bodies, bare rock or peat, artificial surfaces/built land. See 2c for ploughed land. See guidance notes for post-clearfell vegetation	Exit key -not vegetation, see note on bare ground		

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>2a</b>	Vegetation consisting of Bracken at $\geq 95\%$ cover with or without a sparse herbaceous understorey. Stands that have not yet peaked in seasonal biomass should still be recorded as dense Bracken if you believe peak cover is likely to be at least 95%. Note that bracken can occur in amongst boulders and scree. Consideration should be made to map as mosaic with inland rock habitats in this situation.	Dense Bracken (BH 9)	<i>Bracken at 95-100% cover</i>	U20, W25
<b>2b</b>	Bracken <95% cover or absent – the species code for Bracken plus cover intervals should be used in conjunction with any other primary and secondary attributes and relevant BH e.g. Acid grassland. Hence, the underlying species assemblage requires further keying.	<b>3</b>		U20, W25, other grasslands and heaths
<b>2c</b>	Vegetation consisting of crops (including grass leys in arable rotation). Note that ploughed land should be indicated as such but a primary attribute used to reflect the previous crop where this can be identified. If not possible, use 'ploughed land' as a primary attribute (also see guidance notes for Orchards).	Arable and Horticultural (BH 4)	<i>Theme: Agricultural crop. crops listed in drop-down box</i>	
<b>3a</b>	Vegetation containing halophytic species	4		
<b>3b</b>	Vegetation not as above.	5		
<b>4a</b>	Vegetation consisting of frequent to dominant halophytes, usually on mud often much bare ground.	26		
<b>4b</b>	Vegetation with halophytes prominent. On sea cliffs.	Maritime cliffs and slopes vegetation Priority Habitat PH (BH Supra-littoral Rock)	<i>Maritime vegetation</i>	
<b>4c</b>	Vegetation growing on sand dunes including yellow dunes, grey dunes and slacks.	Sand dune Priority Habitat (BH 19 Supra-littoral sediment)	<i>Sand dune vegetated</i>	



		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
4d	Generally linear vegetation, just above the high-tide mark, consisting of halophytes such as <i>Cakile maritima</i> , <i>Agropyron junceiforme</i> and <i>Honkenya peploides</i> . Sometimes with generalist ruderals such as <i>Stellaria media</i> and <i>Rumex obtusifolius</i> .	Strandline/Coastal vegetated shingle Priority Habitat (BH 19 Supra-littoral sediment)	Strandline vegetation	
4e	Sparsely vegetated shingle with halophytes such as <i>Rumex crispus</i> , <i>Crambe maritima</i> , <i>Glaucium flavum</i> , <i>Silene uniflora</i> , <i>Beta vulgaris maritima</i> , <i>Lathyrus japonicus</i> , <i>Picris echioides</i>	Strandline/Coastal vegetated shingle Priority Habitat (BH 19)	Strandline vegetation	
4f	<i>Phragmites australis</i> is dominant but with halophytic species in underlayer	Reedbeds Priority Habitat (BH 11 Fen, Marsh, Swamp)		
5a	<b>Pulse-disturbance vegetation.</b> Includes assemblages whose <b>species composition</b> suggests disturbance in the past but with no evidence of being subject to recent sustained management cycles that involve grazing with or without mowing. Two specific groups of plant assemblage are included here. Firstly, <b>wetland tall-herb</b> including reedbeds, sedge swamps and tall-herb dominated gaps in wet woodland plus emergent aquatic vegetation that is often zoned and on the fringes of waterbodies. The second group includes very diverse <b>communities of drier soils</b> assembling in response to previous unpredictable disturbance. Often found in urban situations, in woodland gaps and clearfell or on linear features but including setaside – see guidance notes for further details.	6		

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>5b</b>	<b>Press-disturbance vegetation.</b> Includes all grazed <b>upland and lowland grasslands along with meadows and silage fields</b> . Also included are those <b>amenity grasslands</b> which maybe rabbit grazed but are generally managed by frequent repeated mowing. Also included are areas of <b>monocot rather than dwarf shrub dominated bogs and heaths</b> – see guidance notes for further details. Plant assemblages may reflect wet to dry, acid to calc conditions but the common feature is that they experience a relatively stable, cyclic disturbance regime where biomass is removed by annual cutting or/and continuous grazing at <b>varying</b> intensities.	<b>8</b>		
<b>6a</b>	Wetland tall herbs or sedges frequent to dominant.	<b>6c-g</b>		
<b>6b</b>	Wetland tall herbs occasional to absent.	<b>7a-c</b>		
<b>6c</b>	Terrestrial vegetation growing on lowland peat soils often with or without scattered Alder or Willow. Species include <i>Carex paniculata</i> , <i>C. acutiformis</i> , <i>C.rostrata</i> , <i>C.elata</i> , <i>C.riparia</i> , <i>Iris pseudacorus</i> , <i>Filipendula ulmaria</i> , <i>Phragmites australis</i> (but not virtually pure stands), <i>Equisetum fluviatile</i> , <i>Eupatorium cannabinum</i> , <i>Lythrum salicaria</i> . See guidance notes.	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Fen</i>	S1-S28 (but not S4) M27, M28, OV26
<b>6d</b>	Aquatic vegetation where macrophytes persist as emergents within standing water. Species include <i>Typha</i> spp., <i>Schoenoplectus</i> , <i>Ranunculus fluitans</i> , <i>Sparganium</i> spp, <i>Sagittaria</i> , <i>Hippuris</i> and others. Does not include beds of floating and submerged aquatics eg. <i>Chara</i> spp., <i>Potamogeton</i> spp., <i>Ceratophyllum</i> spp.	Aquatic macrophytes (BH Rivers and streams)	<i>Aquatic macrophytes</i>	
<b>6e</b>	Stands dominated by <i>Phragmites australis</i> in standing saline or freshwater.	Reedbeds Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Reedbed</i>	S4, S24, S25, S26

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>6f</b>	Vegetation fringing open water often developed as a narrow (<0.5m wide or <0.25ha in extent) part of a hydrosere between standing water and upslope vegetation. Species include <i>Valeriana officinalis</i> , <i>Epilobium hirsutum</i> , <i>Filipendula ulmaria</i> , <i>Oenanthe crocata</i> , <i>Stachys palustris</i> and <i>Lythrum salicaria</i> .	Aquatic marginal vegetation (BH 11 Fen, Marsh, Swamp )	<i>Aquatic marginal vegetation</i>	
<b>6g</b>	Fertile, wetland tall-herb vegetation with less than 50% grass cover. Dominated by characteristic species such as <i>Epilobium hirsutum</i> , <i>Urtica dioica</i> , <i>Filipendula ulmaria</i> , <i>Phragmites</i> , <i>Arrhenatherum</i> .	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Tall herb wetland vegetation</i>	OV26
<b>7a</b>	Mid to late-successional pulse-disturbance vegetation consisting entirely of long-lived perennials with little or no open ground. Vegetation with over 50% grass cover. <i>Arrhenatherum</i> , <i>Dactylis</i> and <i>Elymus repens</i> usually dominate but scattered shrubs and tall herbs maybe present particularly along linear features such as road verges, field boundaries, tracksides and ditchbanks.	Neutral Grassland (BH 6)	<i>Tall unmanaged neutral grass</i>	OV23, OV25, OV27, MG1
<b>7b</b>	Early-successional pulse-disturbance vegetation dominated by annual weeds as well as perennial species usually with some open ground present. Open ground usually conspicuously present. Actual species composition dependent upon starting point. <b>Unsown setaside</b> will usually key out here. Indicators include <i>Poa annua</i> , <i>Plantago major</i> , <i>Agrostis stolonifera</i> , <i>Polygonum aviculare</i> , <i>Persicaria maculosa</i> , <i>Anisantha sterilis</i> , <i>Stellaria medi</i> and a diverse range of arable weeds. Excludes weed assemblages with managed crops present. These key out at <b>2c</b> .	Arable and Horticultural BH (BH 4) or Urban (BH 17)	<i>Annual /early successional with open ground</i>	OV21-23

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
7c	Vegetation containing some annual weeds but consisting mainly of long lived perennials including some grasses but <50% cover. Some shrubby species may be present as infrequent juveniles. Species include <i>Urtica dioica</i> , <i>Galium aparine</i> , <i>Chamaerion angustifolium</i> , <i>Cirsium arvense</i> , <i>Arrhenatherum elatius</i> and <i>Poa trivialis</i> . Includes stands dominated by invasive aliens such as <i>Reynoutria japonica</i> , <i>Impatiens glandulifera</i> and <i>Heracleum mantegazzianum</i>	Neutral Grassland (BH 6)	<i>Perennial vegetation, tall herb/grass</i>	OV24
7d	50-80% cover of grasses (notably <i>Holcus lanatus</i> ) on old mine spoil or serpentine soils, with metalophyte species occurring e.g. <i>Minuartia verna</i> , <i>Thlapsi arvense</i> , <i>Armeria maritima</i> , <i>Silene maritima</i> , <i>Thlapsi caerulescens</i> , <i>Lychnis alpina</i> , <i>Cerastium nigrescens</i> .	Calaminarian Grassland Priority Habitat (Inland Rock BH16)-		
8a	Grassland of many types with Mature and/or Ancient trees present (much lower than 25% cover), often in a parkland setting. Record this habitat and continue key for overlapping habitats.	Wood-pasture and Parkland Priority Habitat (not currently on PH/BH list)	Record as grassland with parkland as Primary qualifier	
8b	Vegetation usually dominated by palatable grasses with a rich or poor suite of accompanying herbs that indicate neutral, dry or damp soils. <b>Calcareous or acid indicator species infrequent, rare or absent.</b> Neutral indicators include <i>Trifolium repens</i> , <i>Lolium perenne</i> , <i>Stellaria media</i> , <i>Cynosurus cristatus</i> , <i>Trifolium pratense</i> , <i>Centurea nigra</i> , <i>Lotus corniculatus</i> , <i>Cerastium fontanum</i> , <i>Rumex acetosa</i> , <i>Ranunculus repens</i> , <i>Juncus inflexus</i> , <i>Juncus effusus</i> , <i>Montia fontana</i> , <i>Glyceria fluitans</i> , <i>Poa trivialis</i> , <i>Agrostis stolonifera</i> , <i>Juncus bufonius</i> and <i>Alopecurus geniculatus</i> .	9		

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>8c</b>	Calcareous indicators of wet or dry ground present eg. <i>Galium verum</i> , <i>Briza media</i> , <i>Carlina vulgaris</i> , <i>Cirsium acule</i> , <i>Sanguisorba minor</i> , <i>Sesleria albicans</i> , <i>Helianthemum nummularia</i> , <i>Cirsium dissectum</i> , <i>Carex pulicaris</i> , <i>C. flacca</i> , <i>C. panicea</i> , <i>Eriophorum latifolium</i> , <i>Gymnadenia conopsea</i> .	<b>10</b>		
<b>8d</b>	Acid indicators present (includes a large range of acid grassland, moorland, heath and peatland species).	<b>11</b>		
<b>9a</b>	Productive grasses and <i>Trifolium repens</i> usually (see below) dominate mainly <i>Lolium</i> , <i>Phleum pratense</i> , <i>Dactylis</i> , <i>Cynosurus</i> , <i>Holcus lanatus</i> and the larger <i>Festuca</i> spp. <i>Agrostis capillaris</i> , <i>Cynosurus cristatus</i> and <i>Anthoxanthum odoratum</i> may be present at the less fertile end of the gradient. In wet grasslands <i>Juncus effusus</i> , <i>Deschampsia cespitosa</i> , <i>Glyceria fluitans</i> , <i>Alopecurus geniculatus</i> and <i>Festuca arundinacea</i> may be abundant. Varies from pure grass to moderately species rich grassland but hay meadow Priority Habitat indicators are always rare or absent. Some fields may be dominated by <i>Ranunculus</i> and/or <i>Trifolium repens</i> .	<b>17</b>		
<b>9b</b>	Cover of grass species <i>Trifolium repens</i> and sown <i>T. pratense</i> usually less than 50%. Typically rich in forb species with frequent Priority Habitat <b>lowland</b> meadow indicators including <i>Lathyrus pratensis</i> , <i>Lotus corniculatus</i> , <i>Leucanthemum vulgare</i> , <i>Galium verum</i> , <i>Primula veris</i> , <i>Centaurea nigra</i> , <i>Leontodon hispidus</i> , <i>Ranunculus bulbosus</i> or on flood meadows some of <i>Caltha palustris</i> , <i>Sanguisorba officinalis</i> , <i>Filipendula ulmaria</i> and <i>Alopecurus pratensis</i> . Note that vegetation dominated by <i>F. ulmaria</i> keys out at <b>6g</b> .	Lowland hay meadows Priority Habitat (BH 6 Neutral Grassland)	<i>Herb-rich grassland</i>	MG4, MG5, MG8

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>9c</b>	Cover of grass species and clover usually less than 50% with a high proportion of Priority Habitat <b>upland</b> meadow indicators such as <i>Geranium sylvaticum</i> , <i>Alchemilla</i> spp., <i>Trisetum flavescens</i> , <i>Conopodium majus</i> and <i>Anthoxanthum odoratum</i> .	Upland hay meadows Priority Habitat (BH 6 Neutral Grassland)	<i>Herb-rich grassland</i>	MG3
<b>9d</b>	Neutral flushes typically picking out enriched springlines and water seepage zones in lowland or upland situations. <b>Acidic and calcareous indicators are absent or rare.</b> Characteristic species include <i>Agrostis stolonifera</i> , <i>Calliargon cuspidatum</i> , <i>Lotus uliginosus</i> , <i>Montia fontana</i> , <i>Alopecurus geniculatus</i> , <i>Juncus articulatus</i> , <i>Caltha palustris</i> , <i>Brachythecium rivulare</i> , <i>J. bufonius</i> , <i>Glyceria fluitans</i> , <i>Ranunculus acris</i> , <i>Veronica beccabunga</i> , <i>Chrysosplenium oppositifolium</i> .	Fen, Marsh, Swamp Broad Habitat (BH 11)	<i>Flush</i>	
<b>9e</b>	Not as above.	<b>10</b>		
<b>10a</b>	Vegetation on dry ground with scattered sedges and many calcicoles present. Can be relatively species poor but often species rich with >50% forb cover. On calcareous soils, usually rendzinas on chalk or limestone in lowland Britain. Indicators include <i>Bromus erectus</i> , <i>Brachypodium pinnatum</i> , <i>Linum catharticum</i> , <i>Sanguisorba minor</i> , <i>Carlina vulgaris</i> , <i>Cirsium acaule</i> , <i>Hippocrepis comosa</i> and <i>Asperula cynanchica</i> , <i>Filipendula vulgaris</i> , <i>Galium verum</i> , <i>Briza media</i> , <i>Koeleria macrantha</i> and <i>Helianthemum nummularia</i> .	Lowland Calcareous Grassland Priority Habitat (BH 7 Calcareous Grassland)	<i>Lowland Calcareous grassland</i>	CG1-CG9, CG10,

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>10b</b>	As <b>10a</b> but often low in species richness. Often dominated by <i>Sesleria albicans</i> with <i>Festuca ovina</i> , <i>Thymus praecox</i> , <i>Galium sternerii</i> and <i>Agrostis capillaris</i> characteristic. Stands may comprise a confusing mix of calcicoles and acidophiles. Montane forms sometimes contain Arctic-Alpine plants, such as <i>Alchemilla alpina</i> , <i>Polygonum viviparum</i> and <i>Silene acaulis</i> . <i>Dryas octopetala</i> is also locally indicative.	Upland Calcareous Grassland Priority Habitat (BH 7 Calcareous Grassland)	<i>Upland Calcareous grassland</i>	CG10- CG14, U5c
<b>10c</b>	Rush or/and <i>Molinia</i> dominated vegetation usually on peat or peaty-gley soils with <i>Juncus acutiflorus</i> and/or <i>subnodulosus</i> abundant. Usually on level ground in lowland or marginal uplands. Acid indicators may be present but especially notable are uncommon assemblages of rich fen species such as <i>Juncus subnodulosus</i> , <i>Craex pulicaris</i> , <i>C. hostiana</i> , <i>Cirsium dissectum</i> , <i>Epipactis palustris</i> , <i>Crepis paludosa</i> , <i>Geum rivale</i> , <i>Briza media</i> , <i>Gymnadenea conopsea</i> and <i>Serratula tinctoria</i>	Purple Moor Grass and Rush Pastures Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Purple moor grass rush pasture</i>	M22, M24, M26
<b>10d</b>	Localised areas of vegetation, often visibly associated with seepage zones where water movement is vertical (topogenous mires) or lateral (soligenous mires). Usually with several sedge species and species of wet soils. Includes <i>Briza media</i> , <i>Schoenus nigricans</i> , <i>Pinguicula vulgaris</i> , <i>Parnassia palustris</i> , <i>Carex hostiana</i> , <i>Carex dioica</i> , <i>Drosera anglica</i> , <i>Eriophorum latifolium</i> , <i>Primula farinosa</i> . Often with abundant <i>Molinia</i> .	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Flush</i>	M9-14
<b>10e</b>	Not as above	<b>11</b>		

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>11a</b>	Rush or/and <i>Molinia</i> dominated vegetation usually on peaty-gley soils with <i>Juncus acutiflorus</i> or <i>Juncus effusus</i> abundant to dominant. Indicators of rich fen are absent. Instead typical species include <i>Galium palustre</i> , <i>Cirsium palustre</i> , <i>Ranunculus flammula</i> , <i>Agrostis canina</i> , <i>Mentha aquatica</i> , <i>Achillea ptarmica</i> , <i>Equisetum palustre</i> , <i>Cardamine pratensis</i> , <i>Epilobium palustre</i> and <i>Angelica sylvestris</i> <sup>1</sup> .	Purple Moor Grass and Rush Pastures Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Purple moor grass rush pasture</i>	M23, M25
<b>11b</b>	Not as above.	<b>12</b>		
<b>12a</b>	Localised narrow wet areas of vegetation or obvious flushing. Vegetation usually dominated by acidiphilous species eg. <i>Sphagnum</i> spp, <i>Juncus effusus/articulatus/acutiflorus</i> , <i>Carex echinata</i> , <i>Ranunculus flammula</i> , <i>Stellaria alsine</i> , <i>Carex rostrata</i> , <i>Carex nigra</i> . Often bryophyte rich.	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Flush</i>	M4-8
<b>12b</b>	Vegetation with many acid indicators. Not associated with clearly defined flushes and depressions but characterising larger, more extensive drier or wetter ground. Hence, all bogs with low cover of dwarf shrub heaths plus upland and lowland acid grasslands key out here.	<b>13</b>		
<b>13a</b>	Sub-arctic indicators present, for example prostrate <i>Salix herbacea</i> and <i>Calluna</i> , , <i>Carex bigelowii</i> , <i>Juniperus communis ssp. nana</i> , <i>Empetrum nigrum ssp hermaphroditum</i> and <i>Racomitrium lanuginosum</i> . Includes montane, snowbed and sub-arctic sedge and rush communities on raw thin podzols, rankers and semi-skeletal soils.	Montane (BH 15)	<i>Sub-arctic (Montane)</i>	U7-12, U14-15, H13-15, H17, H19, H20, H22, W20
<b>13b</b>	Sub-arctic indicators not present, Peatland species under 25% on variable soil types. <i>Juncus effusus</i> , <i>J.conglomeratus</i> and <i>J.acutiflorus</i> can be abundant.	<b>14</b>		

<sup>1</sup> Species-poor *Molinia* stands when associated with upland bog systems and flushes will key out as Moorland grass or be included pragmatically in a wider blanket bog unit. Similarly, grazed Fertile and Acid grasslands in the uplands and west of Britain can have a frequent to dominant overstorey of *Juncus effusus* and should be placed in those BH rather than in Purple Moor grass and Rush Pastures. Hence, to qualify as Purple Moor grass and Rush pasture PH the stand must have a reasonable representation of the listed indicator species.



		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>13c</b>	Sub-arctic indicators not present , Cover of peatland species over 25%. Indicators include <i>Tricophorum</i> , <i>Molinia</i> , <i>Sphagnum</i> , <i>Eriophorum</i> spp., <i>Juncus squarrosus</i> and <i>Myrica</i> . Usually on deep-peats or wet peaty rankers. <i>Juncus effusus</i> and <i>J. acutiflorus</i> scarce or absent	15		
<b>14a</b>	Fine grasses predominate in generally dry situations eg. <i>Agrostis curtisii</i> , <i>Festuca ovina</i> and <i>Anthoxanthum odoratum</i> usually on brown podzolic soils or rankers. Acid indicators present eg. <i>Galium saxatile</i> , <i>Potentilla erecta</i> , <i>Pleurozium schreberi</i> and <i>Rumex acetosella</i> .	Acid Grassland (BH 8)	<i>Acid grassland</i>	U2, U4
<b>14b</b>	Grassland that can include a high proportion of bare ground or with a high proportion of <i>Cladonia</i> spp and small annuals such as <i>Erophila verna</i> , <i>Aphanes arvensis</i> and <i>Myosotis ramosissima</i> . Found on nutrient poor sandy soils or shingle in the lowlands below 300m. Typical species are <i>Festuca ovina</i> , <i>Galium saxatile</i> , <i>Sedum acre</i> , <i>Rumex acetosella</i> , <i>A. capillaris</i> and <i>Potentilla erecta</i> . Also includes lowland stands dominated by <i>Agrostis curtisii</i> and <i>Deschampsia flexuosa</i> . <i>Carex arenaria</i> locally present but only on inland stands.	Lowland Dry Acid grassland Priority Habitat (BH 8 Acid grassland)	<i>Acid grassland</i>	U1-U3, U4c, SD10b, SD11b
<b>14c</b>	Not as above	15		
<b>15a</b>	Coarse grasses predominate generally in <b>upland wet</b> situations eg. <i>Nardus</i> , <i>Molinia</i> , <i>Deschampsia flexuosa</i> and <i>Juncus squarrosus</i> usually on peaty-gley soils. Includes species poor <i>Molinia</i> dominated upland bog slopes and flushes.	Moorland grass (BH 8 Acid Grassland)	<i>Moorland-grass</i>	U5, U6, U7, U13

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>15b</b>	Peat largely >0.5m deep (use peat rod). Scattered to dominant <i>Eriophorum vaginatum</i> often with <i>Sphagnum</i> spp and/or <i>Rubus chamaemorus</i> .	Blanket bog PH <sup>2</sup> (BH 12Bog)	<i>Blanket Bog</i>	M1-M3, M17-M20, (on deep peat H9, H12, M15-16, M25)
<b>15c</b>	Species of wet peat soils predominate. Indicators include <i>Tricophorum</i> , <i>Molinia</i> , <i>Sphagnum</i> , <i>Eriophorum</i> spp. ( <i>E. Vaginatum</i> absent), <i>Narthecium ossifragum</i> , <i>Juncus squarrosus</i> and <i>Myrica gale</i> . Usually on deep-peats or wet peaty rankers. Valley bogs and other peat-based topogenous and soligenous mires key out here if with <=25% cover of Dwarf Shrubs. See guidance notes.	Bog Broad Habitat (BH 12)	<i>Other Bog</i>	M21, M25
<b>15d</b>	Peatland species predominate eg. <i>Tricophorum</i> , <i>Eriophorum angustifolium</i> , <i>Sphagnum</i> spp, <i>Vaccinium oxycoccus</i> and <i>Andromeda polifolia</i> . Often in lowland areas in unimproved/unafforested areas of flood plains. All lowland bog elements that appear to have a groundwater or riverine source to their water table should, depending on their species composition, key out as flushes ( <b>12a</b> or <b>10d</b> ) or at <b>16c</b> . Purely rainfed bog systems should key out here. This separation may be difficult. A good indicator is the location of the bog on level ground with a gently domed structure and an absence of calcicolous and mesotrophic wetland species. The lags around lowland raised bogs also key out here.	Lowland raised bog Priority Habitat (BH 12 Bog)	<i>Other Bog</i>	M1-M4, M17-M20

<sup>2</sup> Blanket Bog, Raised Bog and Other Bog are keyed out on floristic grounds but national estimates of extent further reflect the spatial restriction of the range of each habitat by application of GIS masks.

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>15e</b>	<b>Dominated by dwarf shrubs</b> e.g. <i>Calluna</i> , <i>Erica</i> , usually on podzolic soils but also on brown podzolics, shallow peats (<0.5m), rankers and gleys.	<b>21</b>		
<b>15f</b>	Not as above	<b>16</b>		
<b>16a</b>	Less than 80% conifers in canopy (excluding yew but includes juniper).	<b>19</b>		
<b>16b</b>	More than 80% coniferous in canopy (excluding yew but includes juniper)	Coniferous Woodland (BH 2)	<i>Belt or Clump of trees or Woodland/ Forest</i>	All planted stands of conifers
<b>17a</b>	Palatable grasses dominate mainly <i>Lolium</i> , <i>Dactylis</i> , <i>Cynosurus</i> , <i>Holcus</i> . Grass cover usually over 75%. Broadleaved species restricted to <i>Trifolium repens</i> , <i>Ranunculus repens</i> , <i>Plantago major</i> , <i>Taraxacum</i> , <i>Rumex obtusifolius</i> and <i>Stellaria media</i> . Fertile but wetter situations may support occasional <i>Juncus effusus</i> or <i>J. inflexus</i> , but accompanying species will always indicate high fertility.	Improved Grassland (BH 5)	<i>Fertile Grass</i>	MG6, MG7

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>17b</b>	Palatable grasses predominate, usually <i>Lolium</i> and <i>Phleum pratense</i> 25% or below and other grasses more prominent such as <i>Cynosurus</i> , <i>Agrostis capillaris</i> , <i>Trisetum</i> , <i>Bromus hordeaceus</i> and <i>Anthoxanthum</i> . Semi-improved but wetter situations may support abundant <i>Juncus effusus</i> or <i>J.inflexus</i> , <i>Glyceria fluitans</i> , <i>Agrostis stolonifera</i> and <i>Poa trivialis</i> . Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil eg. <i>Plantago lanceolata</i> , <i>Rumex acetosa</i> , <i>Ranunculus acris</i> , <i>R.repens</i> , <i>Prunella vulgaris</i> , <i>Achillea millefolium</i> , <i>Potentilla anserina</i> , <i>Cirsium palustre</i> and <i>Cardamine pratensis</i> . However, indicators of the two hay meadow Priority Habitats will be rare or absent.	<b>18</b>		
<b>18a</b>	Recently sown mixtures of light grasses for agri-environment schemes or habitat creation/restoration such as <i>Anthoxanthum</i> , <i>Poa pratensis</i> , <i>Festuca rubra</i> , <i>Cynosurus</i> and <i>Trisetum</i> . 50-100% grass cover. Herb species rare or absent. Often on sown field margins.	Neutral Grassland (BH 6)	Recently sown neutral grass	
<b>18b</b>	As above but with high cover of sown mixtures of legumes such as <i>Trifolium pratense</i> , <i>T.hybridum</i> and <i>Lotus corniculatus</i> . Often on sown field margins.	Neutral Grassland (BH 6)	Recently sown neutral grass	
<b>18c</b>	Not as above.	Neutral Grassland (BH 6)	Semi-improved neutral grass	
<b>19a</b>	Scrub on sand dunes and shingle or <i>Salix repens</i> in dune slacks.	Supralittoral sediment (BH19)	Sand dune	

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>19b</b>	All other broadleaved woodland (see guidance notes for Orchards).	<b>22</b>		
<b>20a</b>	<i>Ulex europaeus</i> > 25%.	Broadleaved woodland (BH 1)	<i>Belt of trees or Woodland/Forest</i>	W23
<b>20b</b>	Any of <i>Erica</i> spp., <i>Calluna</i> , <i>Empetrum</i> , <i>Vaccinium</i> or <i>Ulex minor/gallii</i> (co-) dominate but not in coastal situations. Species of wet/deeper peats absent eg. <i>Myrica</i> , <i>Narthecium</i> , <i>Eriophorum</i> spp. and <i>Sphagnum</i> spp absent. Soils generally thin peaty podzols or rankers.	Dry Heath <sup>3</sup> (BH 10 Dwarf Shrub Heath)	<i>Dwarf Shrub heath</i>	
<b>20c</b>	As above but heathland on sand dunes and shingle.	Supralittoral sediment (BH19)	<i>Sand dune</i>	
<b>20d</b>	As above but heathland on maritime cliffs.	Maritime cliff and slope Priority Habitat (BH18)	<i>Maritime vegetation</i>	
<b>20e</b>	Not as above.	<b>21</b>		
<b>21a</b>	Dwarf Shrub Heath with occasional to frequent indicators of wet conditions such as <i>Erica tetralix</i> , <i>Molinia</i> and/or <i>Narthecium</i> but lacking high cover of <i>Sphagnum</i> , <i>Eriophorum</i> spp and <i>Rubus chamaemorus</i> . Peat largely <0.5m in depth where this can be established using peat rod. This is a difficult separation to make particularly regarding degraded ombrogenous mires where low abundance of bog indicators may reflect overgrazing, burning and drainage rather than thinner, drier peats.	Wet heath (BH 10 Dwarf Shrub Heath)	Dwarf Shrub heath	M15, M16

<sup>3</sup> Discrimination between Upland and Lowland heath PH rests on application of altitude-based GIS masks applied post-survey.

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>21b</b>	Peat largely >0.5m, where this is possible to establish using the peat rod. Scattered to dominant <i>Eriophorum vaginatum</i> often with <i>Sphagnum</i> spp and/or <i>Rubus chamaemorus</i> .	Blanket Bog Priority Habitat <sup>4</sup> (BH 12 Bog)	<i>Blanket Bog</i>	M1-M3, M17-M20, (on deep peat H9, H12, M15-M16, M25)
<b>21c</b>	Species of acid peat soils predominate eg. <i>Tricophorum</i> , <i>Eriophorum angustifolium</i> , <i>Sphagnum</i> spp, <i>Vaccinium oxycoccus</i> and <i>Andromeda polifolia</i> . Often in lowland areas in unimproved/unafforested areas of flood plains. All lowland bog elements that appear to have a groundwater or riverine source to their water table should, depending on their species composition, key out as flushes ( <b>12a</b> or <b>10d</b> ) or at <b>16b</b> . Purely rainfed bog systems should key out here. This separation may be difficult. A good indicator is the location of the bog on level ground with a gently domed structure and an absence of calcicolous and mesotrophic wetland species.	Lowland raised bog Priority Habitat (BH12 Bog)	<i>Lowland raised bog</i>	M1-M3, M17-M20
<b>21d</b>	Species of acid peat soils predominate eg. <i>Tricophorum</i> , <i>Molinia</i> , <i>Narthecium ossifragum</i> , <i>Sphagnum</i> and <i>Myrica</i> usually on deep-peat soils or wet peaty rankers. Valley bogs and other topogenous and soligenous mires key out here. See guidance notes.	Bog (BH 12)	<i>Other bog</i>	M21

<sup>4</sup> Blanket Bog, Raised Bog and Other Bog are keyed out on floristic grounds but national estimates of extent further reflect the spatial restriction of the range of each habitat by application of GIS masks.

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>22a</b>	>=50% canopy cover of <i>Alnus glutinosa</i> or >=50% cover of <i>Salix</i> spp. Willow.	Wet woodland Priority Habitat (BH 1 Broadleaved Woodland)	<i>Belt of trees or woodland / Forest</i> (plus secondary attributes see guidance)	W1-W7
<b>22b</b>	>=25% canopy cover of <i>Fagus sylvatica</i> (Beech) or >=25% canopy cover of <i>Taxus baccata</i> (Yew)	Lowland beech Priority Habitat <sup>5</sup> (BH 1 Broadleaved Woodland)	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	W12-W15
<b>22c</b>	>=25% canopy cover <i>Fraxinus excelsior</i> or >=25% canopy cover of <i>Ulmus</i> spp	<b>24</b>	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	(W7a-c, W8a-g, W9a, W12, W13a-b, W14)

<sup>5</sup> GIS masks delimiting the accepted native range for Beech will be used to constrain the range of the Priority Habitat.

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>22d</b>	>=75% canopy cover of native <i>Quercus</i> spp or >= 75% canopy cover of native <i>Betula</i> spp.	<b>23</b>		W8-W9, W13
<b>22e</b>	>=25% canopy cover of Hornbeam ( <i>Carpinus betulus</i> ), Stands of <i>Quercus</i> sp. with <i>Carpinus betulus</i> with Bluebell ( <i>Hyacinthoides non-scripta</i> )	Lowland Mixed Deciduous Woodland Priority Habitat (BH1 Broadleaved Woodland)	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	W10
<b>22f</b>	Not as above.	Broadleaved Woodland (BH 1)	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	
<b>23a</b>	>=95% canopy cover of native <i>Betula</i> spp in Scotland only.	Northern Birchwood Priority Habitat (BH 1)	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	W10e, W11, W17



		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>23b</b>	Not as above.	Upland Oak Woodland Priority Habitat or Lowland Mixed Deciduous Priority Habitat <sup>9</sup> (Broadleaved woodland BH 1)	<i>Belt of trees or woodland /Forest</i> (plus secondary attributes see guidance)	
<b>24a</b>	Upland or hyperoceanic woods with frequent <i>Fraxinus excelsior</i> and/or <i>Ulmus glabra</i> often distinguished by a lush lichen flora.	Upland Mixed Ash priority habitat (Broadleaved Woodland BH)		
<b>24b</b>	Lowland woods with frequent <i>Fraxinus excelsior</i> and/or a suite of other species. Lichen flora not obvious	Lowland Mixed Deciduous Priority Habitat (BH 1 Broadleaved Woodland)		
<b>25a</b>	Limestone, with clints and grikes	Limestone Pavement Priority Habitat (Inland Rock BH16)		
<b>25b</b>	Mine spoil or metalliferous river gravels or serpentine rocks, species include <i>Minuartia verna</i> , <i>Thlapsi arvense</i> , <i>Armeria maritima</i> , <i>Silene maritima</i> , <i>Thlapsi caerulea</i> , <i>Lychnis alpina</i> , <i>Cerastium nigrescens</i> .	Calaminarian Grassland Priority Habitat (Inland Rock BH16)		OV37

		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>25c</b>	Not limestone with clints and grikes nor metalliferous rocks, solid rock outcrops or screes. Includes species such as <i>Cryptogamma crispa</i> , <i>Cystopteris fragilis</i> , <i>Gymnocarpium robertianum</i> and <i>Asplenium trichomanes</i>			
<b>25d</b>	Rocky ungrazed ledges at high altitude with one or more of downy willow <i>Salix lapponum</i> , whortle-leaved willow <i>S. myrsinites</i> , mountain willow <i>S. arbuscula</i> and woolly willow <i>S. lanata</i> . Associated arctic-alpine and northern willows include net-leaved willow <i>S. reticulata</i> , dark-leaved willow <i>S. myrsinifolia</i> and tea-leaved willow <i>S. phylicifolia</i> .			
<b>26a</b>	Coastal saltmarsh	<b>27</b>		
<b>26b</b>	Inland saltmarsh vegetation around natural springs or old mine workings	Saltmarsh Priority Habitat		SM16, SM2 3
<b>26c</b>	Saltmarsh vegetation alongside roads	Linear Features BH3 or Urban BH17		
<b>27a</b>	Pioneer vegetation of lower saltmarshes made up of open stands of perennial glasswort <i>Sarcocornia perennis</i> , glasswort <i>Salicornia</i> spp., or annual seablite <i>Suaeda maritima</i> .	Saltmarsh Priority Habitat (Littoral sediment BH 21)	Saltmarsh	SM7-9, SM27

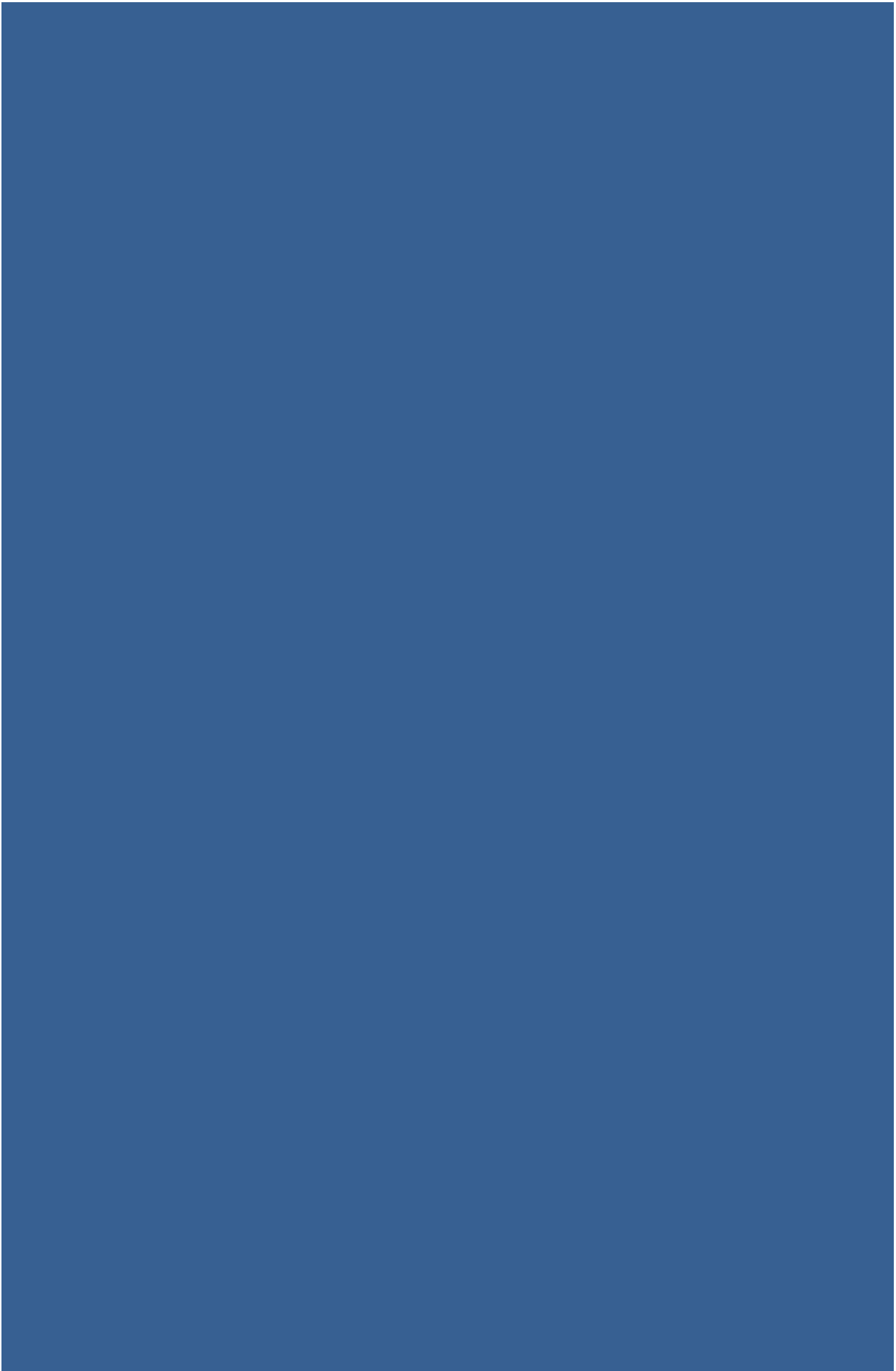
		Numbered links plus Broad & Priority Habitats	Primary attributes	NVC units (indicative list only)
<b>27b</b>	Cord-grass <i>Spartina</i> spp. on a wide range of substrates, from very soft muds to shingle, in areas sheltered from strong wave action. It can be on the seaward fringes of saltmarshes and creek-sides and may occur on old pans in the upper saltmarsh.	Saltmarsh Priority Habitat (Littoral Sediment BH21)	Saltmarsh	SM4-6
<b>27c</b>	Vegetation forming the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented and the saltmarshes can cover large areas, especially where there has been little or no enclosure on the landward side	Saltmarsh Priority Habitat (Littoral Sediment BH21)	Saltmarsh	SM10-20
<b>27d</b>	Halophytic shrubs growing at the base of sea-defences or at the landward slope of salt-marshes or where there is a transition to dunes or shingle. Typically bushes of shrubby sea-blite <i>Suaeda vera</i> and sea purslane <i>Atriplex portulacoides</i> comprise the majority of vegetation.	Saltmarsh Priority Habitat (Littoral Sediment BH21)		SM25

Further guidance notes:

**Pulse-disturbance vegetation:** This will often be a difficult separation to make but refers to early to mid-successional vegetation that may still be undergoing species compositional turnover and either assembling in response to a single infrequent disturbance episode e.g. flooding, felling and natural gap formation in woodlands, or the cessation of disturbance e.g. urban derelict land and fallow arable. Also included here are the annual to less frequently mown communities of boundaries and linear features including hydroses around waterbodies and 'rough' areas of amenity grassland on school playing fields, golf courses and churchyards. Their Assemblages here may often be variable in height but usually typified by tall grasses and herbs not tolerant of grazing or agricultural mowing regimes. Hence, the vegetation is usually more than 25cm in average height. Variation in species composition may be large and unpredictable given the dynamic and spontaneous nature of the colonisation and establishment phases. Nitrophiles will often be very well represented given the association with fertile lowland soils, gardens, arable land and urban environments.

**Press-disturbance vegetation:** There is no naturally sharp distinction between these communities and pulse-disturbance types. Plant assemblages may reflect wet to dry, acid to calc conditions but the common feature is that they experience a relatively stable annual disturbance regime where biomass is removed by annual cutting or/and continuous grazing at varying intensities. Hence, all grazed upland and lowland grasslands are included here along with meadows and silage fields. Also included are those amenity grasslands which may be rabbit

grazed but are generally managed by very frequent mowing. Also included here are areas of monocot rather than dwarf shrub dominated bogs and heaths that may typically be managed less intensively than agricultural lowland grasslands but may nevertheless experience frequent, predictable biomass removal by grazing. Surveyors will often find it difficult to effect the separation between **5a** and **5b**. This simply reflects real difficulties in establishing mapped boundaries when species vary individualistically and the environment varies continuously



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