

# **Middle Barton Fen SSSI (Unit 1)**

## **Botanical and vegetation survey report**

**David Morris**



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**For further information please contact:**

Freshwater Habitats Trust

Bury Knowle House

North Place

Headington

Oxford, OX3 9HY

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## Summary

The Oxfordshire Fens Project is a wetland restoration programme run by Freshwater Habitats Trust aimed at protecting the nationally significant concentration of alkaline fen habitat in the county.

This report presents the results of a survey carried out in 2023 by Freshwater Habitats Trust of unit 1 of Middle Barton Fen, a Site of Special Scientific Interest notified for its fen habitat. Since 2019, the Oxfordshire Fens Project has been restoring part of unit 2 of the Site of Special Scientific Interest. However, recent information about unit 1 is limited, and the purpose of the survey was therefore to survey the plants and vegetation across the unit and assess the condition of the site's notified features, with a focus on wetland habitat.

The survey found 46 wetland plant species, including nine notable species. Wetland species recorded included several that have been lost from many fen sites across the county, such as Curled Hookmoss (*Palustriella commutata*), Long-stalked Yellow-sedge (*Carex lepidocarpa*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Purple Moor-grass (*Molinia caerulea*).

Fen habitat was extensive, covering 1.5 ha, approximately 30 % of unit 1 of the Site of Special Scientific Interest. Most of this comprised the plant community M22 *Juncus subnodulosus*-*Cirsium palustre* fen meadow, which is listed as a feature of the Site of Special Scientific Interest. A small area of fen along a spring-fed stream in the north of the unit constituted alkaline fen habitat, a rare type of wetland habitat not previously recorded from the site. All areas of fen were coarse and dominated by a small number of competitive species, indicating lack of grazing or other disturbance.

In addition to wetland habitat, the site comprised large areas of grassland, with small areas of lowland meadows priority habitat (0.1 ha), a feature of the Site of Special Scientific Interest. More extensive was lowland calcareous grassland priority habitat (0.5 ha), including botanically rich areas with many wildflower species that have declined across the county. Most of the grassland, however, was species-poor and under-grazed. In total, the survey found 160 plant species, including 14 notable species.

The favourable condition of the fen feature of the Site of Special Scientific Interest is dependent on regular removal of biomass, either by grazing or mowing. Although the site is grazed by cattle, the current level grazing does not appear to be sufficient. To improve the species and structural diversity of the fen and other habitats across unit 1 of the Site of Special Scientific Interest, the following are recommended:

- Mow areas of fen vegetation and remove cuttings from site. The objective of mowing is to create more open conditions for more diverse vegetation to establish and make the vegetation more palatable to grazing animals.
- Graze the grassland over winter, e.g. with sheep, and turn out cattle in the spring.

The Oxfordshire Fens Project can support the landowner, land managers and Natural England to implement these recommendations and enhance the Site of Special Scientific Interest for wetland and other wildlife.

# Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Oxfordshire Fens Project .....	1
1.2	Purpose of this report.....	1
<b>2</b>	<b>Methods.....</b>	<b>3</b>
2.1	Botanical survey .....	3
2.2	Vegetation survey .....	3
2.3	Limitations.....	4
<b>3</b>	<b>Results.....</b>	<b>5</b>
3.1	Overview.....	5
3.2	Botanical survey .....	5
3.3	Vegetation survey .....	7
<b>4</b>	<b>Discussion and recommendations .....</b>	<b>10</b>
4.1	Habitats of nature conservation value .....	10
4.2	Habitat management recommendations.....	10
<b>5</b>	<b>References .....</b>	<b>12</b>
<b>Appendix 1</b>	<b>Plant records .....</b>	<b>13</b>
<b>Appendix 2</b>	<b>Vegetation and habitat plans.....</b>	<b>24</b>
<b>Appendix 3</b>	<b>Target notes.....</b>	<b>32</b>



# 1 Introduction

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## 1.1 Oxfordshire Fens Project

Oxfordshire contains a remarkable number of alkaline fens, a rare type of wetland fed by springs emerging from limestone. The habitat has a distinctive vegetation with a short, open structure made up of low-growing grasses, rushes and sedges, and a diversity of wetland wildflowers, growing over mats of colourful mosses. Alkaline fen supports some of the richest plant and animal assemblages in the UK, including many rare and threatened species. Alkaline fen is a habitat listed on Annex 1 of the Habitats Directive ('7230 Alkaline fens'), and much of Europe's surviving alkaline fens are believed to be in the UK.

Freshwater Habitats Trust runs the Oxfordshire Fens Project<sup>1</sup>, which since 2018 has been working with Oxfordshire-based experts, volunteers, land managers and landowners, to restore alkaline fen habitat, and build and share evidence about the state of the county's fens and how best to protect them.

## 1.2 Purpose of this report

Since 2019 the Oxfordshire Fens Project has been restoring fen habitat within unit 2 of Middle Barton Fen Site of Special Scientific Interest (SSSI) in West Oxfordshire. So far, the project had not been involved within unit 1 of the SSSI. Unit 1 has an area of 5.1 ha, approximately 44 % of the area of the SSSI. A map of the SSSI is provided in Figure 1.

This report presents the results of a survey of unit 1 of Middle Barton Fen SSSI (hereafter referred to as 'the site') carried out by Freshwater Habitats Trust in summer 2023.

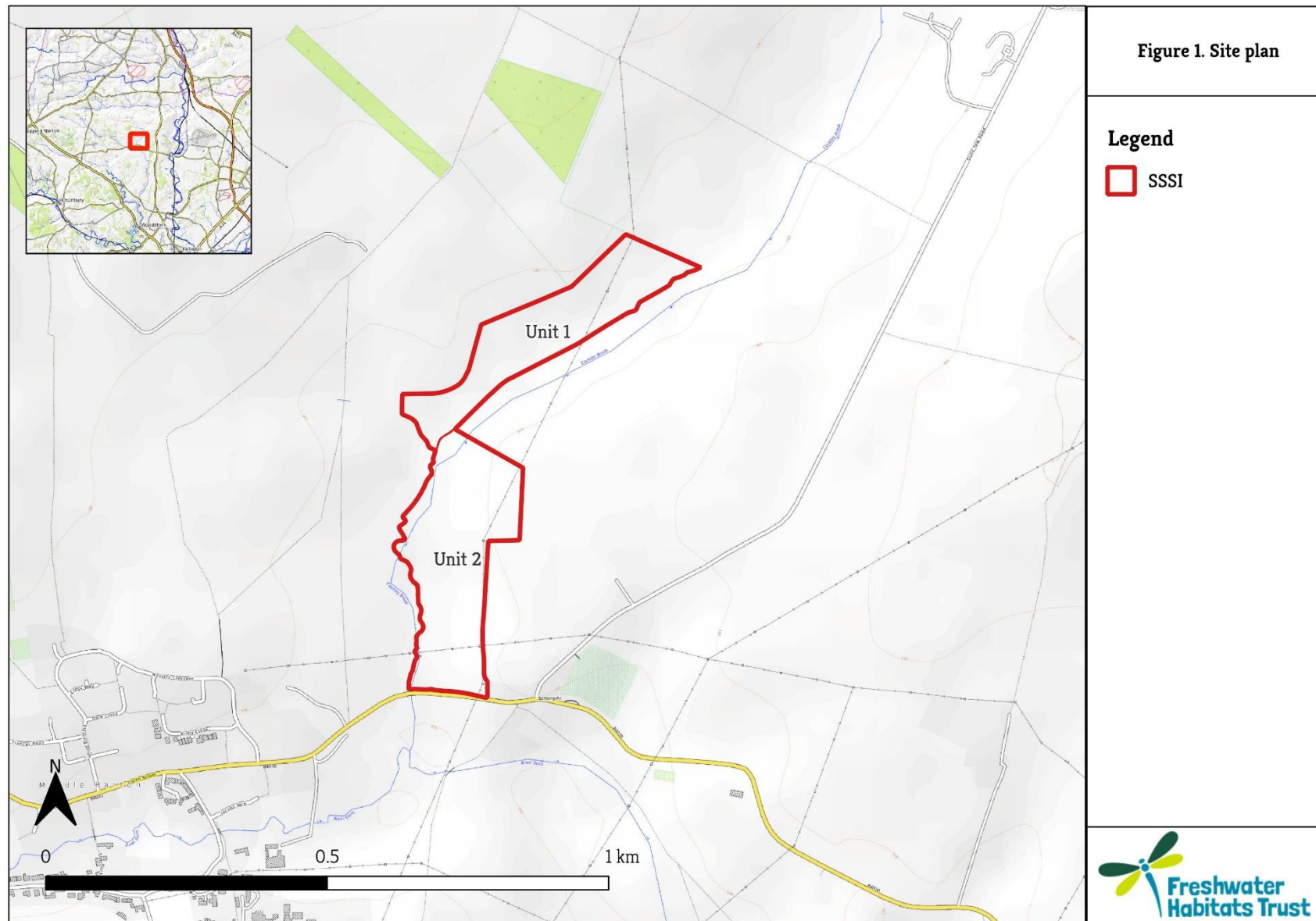
The purpose of the survey was to:

- record the botanical diversity of the site;
- classify and map its vegetation and habitats; and
- identify habitat management measures to improve the condition of the SSSI features.

The survey focused on fen and other wetland habitats, but all habitats within the site were covered.

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<sup>1</sup> <https://freshwaterhabitats.org.uk/projects/oxfordshire-fens-project/>



## 2 Methods

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The survey was carried out on the 16<sup>th</sup> and 17<sup>th</sup> July 2023 by Freshwater Habitats Trust's Senior Plant Ecologist David Morris MCIEEM. The survey covered the whole of unit 1 of Middle Barton Fen SSSI (Figure 1).

Methods for the botanical and vegetation elements of the survey are described below.

### 2.1 Botanical survey

A list of all bryophyte (liverworts, hornworts and mosses) and vascular plant species<sup>2</sup> encountered during the survey was compiled. The survey largely focused on vascular plants, as the timing of survey was not favourable to recording bryophytes generally and a more complete list would have required intensive searching in habitats of peripheral interest to the survey (e.g. on trees, in disturbed ground). As the vegetation was very heterogenous across the site, species abundance was not recorded. Nomenclature for species followed Blockeel *et al.* (2021) for bryophytes and Stace (2019) for vascular plants.

If encountered, further information, such as a grid reference, was recorded about notable plants, defined as:

- legally protected species listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended); and
- plants of local or national conservation concern, i.e.
  - species of principal importance, listed in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006;
  - Nationally Rare or Nationally Scarce taxa (BSBI, 2020);
  - species listed as Near Threatened, Vulnerable, Endangered or Critically Endangered on the vascular plant red lists for Great Britain (Cheffings *et al.*, 2005) or England (Stroh *et al.*, 2014); or
  - species listed as rare or scarce in Oxfordshire (Erskine *et al.*, 2018).

Invasive non-native plant species were also recorded, such as those listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), or other invasive or potentially invasive non-native plants.

### 2.2 Vegetation survey

The methodology of the National Vegetation Classification (NVC) (Rodwell, 2006) was followed to classify vegetation within the area surveyed. Homogenous stands of vegetation were mapped and assigned to units of the NVC, to sub-community where possible. Assignment of units of the NVC was made in the field. Some vegetation could not be assigned to units of the NVC and was assigned to *ad hoc* units, e.g. disturbed, early successional or artificial habitats or stands of single species not included in the NVC.

Vegetation types were assigned primary and secondary habitat codes of the UK Habitat Classification (Butcher *et al.*, 2020). Primary habitats were classified to level four of the hierarchy. For ease of display and discussion in this report, the UK Habitat Classification types were grouped into simpler, more easily understandable broad habitat types. These are described in section 3.3.

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<sup>2</sup> In this report, 'species' refers to any taxon at or below the level of taxonomic species, including hybrids and infraspecific tax, as well as species aggregates.

Vegetation mapping was detailed, with herbaceous vegetation mapped at a scale of approximately 1:1,000, with stands resolved as polygon features if having an area greater than approximately 4m<sup>2</sup>. Woodland was mapped at a larger arbitrary scale.

Mapping was undertaken using maps produced in ArcGIS Pro, comprising Bing satellite imagery at 1:1,000 scale and overlain with 100m and 10m grids. The survey maps were printed and annotated in the field, using a Garmin eTrex® 10 handheld GPS unit to locate position (horizontal accuracy approximately 5m). Completed maps were scanned, and georeferenced and digitised in QGIS.

In addition, target notes were recorded to describe vegetation structure and other habitat features. Hydrological features such as watercourses, springs and seepages, and artificial drainage, were also recorded.

## **2.3 Limitations**

There were no limitations to the survey.

## 3 Results

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### 3.1 Overview

The site comprises the west side of the valley of the Cockley Brook, which flows from north-east to south-west along the southern boundary of the site. A small tributary valley enters the main valley in the south-west, with an unnamed stream flowing from the west and forming the site's south-western boundary. In the southern corner of the site, the confluence with the Cockley Brook is the boundary with unit 2 of the SSSI. The topography of the site slopes from the high ground along the northern boundary, south-east or south-west toward the two watercourses, with a flatter area along the northern boundary of the site.

A total of 160 plant species were recorded from the site, consisting of one species of liverwort, seven moss species and 152 vascular plant species. A full list of species recorded is given in Appendix 1. Results of the botanical survey are described in section 3.2.

The vegetation of the site showed patterns associated with topography and situation within the valley, reflecting hydrology and underlying geology. Wetland habitat was present in two distinct areas, in the north-east and south-west. The northern wetland area was bounded to the south-west by a small watercourse fed by a spring along the northern boundary of the site. Most of the wetland habitat comprised soligenous rich-fen vegetation, indicative of areas where calcareous groundwater discharges from the bedrock along the sides of the valley. Much of this vegetation was coarse and appeared ungrazed. Habitat between the two wetland areas, and on the slopes above, was dominated by neutral and calcareous grassland. Calcareous grassland was present in a zone above wetland areas.

Plans of vegetation and habitats recorded are shown in Figures 2 and 3, Appendix 2. Target notes and photographs are provided in Appendix 3, and their locations are shown in Figure 2. Figure 3 shows hydrological features recorded (streams, springs etc.).

### 3.2 Botanical survey

#### 3.2.1 Wetland plants

Following Freshwater Habitats Trust's list of wetland plants<sup>3</sup>, the survey recorded one floating-leaved aquatic plant species and 46 emergent plant species (see Appendix 1). This represents 30 % of the total number of vascular plants recorded, the other species being largely associated with non-wetland habitats, such as grassland.

Following Wheeler's list of fen species published in Fojt (1993), the survey found 36 'principal fen species' and five 'rare fen species' (see Appendix 1). The rare species included the liverwort *Pellia endiviifolia*, but this is not a rare plant in wetlands in Oxfordshire.

Two of the rare fen species were mosses of rich-fens, Curled Hookmoss (*Palustriella commutata*) and Tall Thyme-moss (*Plagiomnium elatum*). The latter is present in many of the county's fens where it is often abundant, but Curled Hookmoss is much rarer, largely restricted to tufa-forming springs. It was found in the very wet area of fen along the small spring-fed watercourse in the north of the site, growing on tufa<sup>4</sup> under dense Blunt-flowered Rush (*Juncus subnodulosus*) and other species characteristic of alkaline fen habitat such as Bottle Sedge (*Carex rostrata*) and Long-stalked Yellow-sedge (*Carex lepidocarpa*).

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<sup>3</sup> <https://freshwaterhabitats.org.uk/wp-content/uploads/2015/03/34-WETLAND-PLANTS-ENGLISH-RECORDING-FORM-FINAL.pdf>

<sup>4</sup> A calcium carbonate mineral formed by precipitation in springs and streams.

Other fen species characteristic of fens in Oxfordshire included Marsh Arrowgrass (*Triglochin palustris*), Marshy Pennywort (*Hydrocotyle vulgaris*), Marsh Valerian (*Valeriana dioica*) and Purple Moor-grass (*Molinia caerulea*). Marsh Arrowgrass was found only by the spring-fed stream in the north of the site (near target note 10). Bottle Sedge and Purple Moor-grass were also present here, and the latter on the banks above. Bottle Sedge was also found in the south-west of the site, and Purple Moor-grass was found locally in fen in the north of the site. Marsh Pennywort was abundant in fen in the north-east of the site (around target note 2), growing through dense Blunt-flowered Rush and flowering profusely. Marsh Valerian was locally frequent in areas of fen across the site.

One small population of Tormentil (*Potentilla erecta*) was found in an area of species-rich grassland in a transitional zone between calcareous grassland and fen (near target note 8). A small number of plants of Distant Sedge (*Carex distans*) were found in the same zone. Ragged-Robin (*Silene flos-cuculi*) was scattered across the site.

### 3.2.2 Notable plants

Fourteen notable plants were recorded, listed in Table 1. Nine of the species of conservation concern were wetland species, described in the previous subsection. All of these species have declined significantly in Oxfordshire and have been lost from many fen sites (Freshwater Habitats Trust, unpublished data).

Non-wetland species of conservation concern were found in areas of species-rich calcareous grassland. Numerous plants of Devil's-bit Scabious (*Succisa pratensis*) and Quaking-grass (*Briza media*) were present in two areas (target notes 8 and 25), but populations of Harebell (*Campanula rotundifolia*) and Hoary Plantain (*Plantago media*) appeared to be small and were only found in one location (target note 8). Spiny Restharrow (*Ononis spinosa*) was found on a bank in the north of the site (target note 13).

### 3.2.3 Invasive non-native plants

No invasive non-native plants were recorded.

**Table 1** Notable plants recorded. Species in bold font are wetland species.

Scientific name	Common name	Conservation status
<i>Briza media</i>	Quaking-grass	England Near Threatened
<i>Campanula rotundifolia</i>	Harebell	England Near Threatened
<b><i>Carex distans</i></b>	Distant Sedge	Oxon Scarce
<b><i>Carex lepidocarpa</i></b>	Long-stalked Yellow-sedge	Oxon Scarce
<b><i>Carex rostrata</i></b>	Bottle Sedge	Oxon Scarce
<b><i>Hydrocotyle vulgaris</i></b>	Marsh Pennywort	England Near Threatened
<b><i>Molinia caerulea</i></b>	Purple Moor-grass	Oxon Scarce
<i>Ononis spinosa</i>	Spiny Restharrow	England Near Threatened
<i>Plantago media</i>	Hoary Plantain	England Near Threatened
<b><i>Potentilla erecta</i></b>	Tormentil	England Near Threatened
<b><i>Silene flos-cuculi</i></b>	Ragged-Robin	England Near Threatened
<i>Succisa pratensis</i>	Devil's-bit Scabious	England Near Threatened
<b><i>Triglochin palustris</i></b>	Marsh Arrowgrass	England Near Threatened



Scientific name	Common name	Conservation status
<i>Valeriana dioica</i>	Marsh Valerian	England Near Threatened

### 3.3 Vegetation survey

#### 3.3.1 Wetland habitats

##### Summary

The main patterns in the wetland vegetation were related to topographic zones within the valley. Broadly, the middle slopes were occupied by soligenous fen vegetation typical of slopes with strong seepage of calcareous groundwater, with the valley bottom comprised of topogenous fen vegetation indicative of accumulation of water from the slopes above, and probably overlying less permeable alluvial substrates (target notes 2, 3, 4, 21, 23, 24, 27, 28).

This pattern was similar between the north-eastern and south-western wetland areas, though the valley slope in the south-western area had a more stepped topography, producing subtly different vegetation. The area where the two valleys met appeared, based on vegetation, to be a groundwater divide (target note 23).

Some areas were very wet, suggesting localised upwellings of groundwater (target note 7), The fen along the spring-fed stream in the north was very wet (target notes 10-14 and 15-17).

Water accumulating in the valley bottom appeared to flow into the Cockley Brook by three small outlets (target notes 22 and 26), marked by areas of short vegetation dominated by Plicate Sweet-grass (*Glyceria notata*). In the north-east, the southern third of the wetland area appeared to drain into the spring-fed stream flowing into the Brook (target note 18).

##### Soligenous fen

Soligenous fen vegetation was characterised by Blunt-flowered Rush, with extensive areas of the valley slopes dominated by dense stands of this species, referred to M22 *Juncus subnodulosus*-*Cirsium palustre* fen meadow. At the time of survey, in many areas the rush had collapsed to form a dense mat. Associated species were few, but included notable wetland plants such as Marsh Pennywort, Marsh Valerian and Purple Moor-grass. Tall Thyme-moss was also associated with this vegetation.

Along the upper edge of zones of Blunt-flowered Rush dominated fen were stands of vegetation transitional to grassland, rich in both wetland and grassland species. Distant Sedge was found in this zone in two areas and supported the only populations of Carnation Sedge (*Carex panicea*) and Common Sedge (*C. nigra*) found during the survey. This vegetation was referred to M22b *Juncus subnodulosus*-*Cirsium palustre* fen meadow. In the south-west of the site, a narrow zone of vegetation that was similar but lacked Blunt-flowered Rush and had a grassier structure, was referred to the grassland plant community MG8b *Cynosurus cristatus*-*Caltha palustris* grassland, typical sub-community (target note 24).

In addition to the areas of seepage dominated by Blunt-flowered Rush, there appeared to be a zone of weaker seepage perched above it, marked by stands of dense Hard Rush (*Juncus inflexus*). Associated species were few but included Marsh Thistle (*Cirsium palustre*) and Meadowsweet (*Filipendula ulmaria*). This vegetation was referred to the Hard Rush variant of M22. This is within Wheeler's original concept of 'fen meadow' vegetation (Wheeler, 1980), although it is not recognised in the NVC. In the south-west of the site, this area of weak seepage was contiguous with the Blunt-flowered Rush-dominated fen below, but in the north the two were separated by calcareous grassland. Similar Hard Rush vegetation also occupied parts of the valley bottom (see below).

The vegetation along the spring-fed stream in the north of the site was also dominated by Blunt-flowered Rush, but Bottle Sedge, Long-stalked Yellow-sedge, Marsh Arrowgrass, Purple Moor-grass and the brown moss Curled Hookmoss were present. The moss formed large mats in several places and was associated with encrustations of tufa, especially along the steep banks of the stream to the north (target notes 11 and 12). The wetness, presence of tufa and this suite of species, especially Bottle Sedge and Curled Hookmoss, are more characteristic of types of alkaline fen habitat such as M13 *Schoenus nigricans*-*Juncus subnodulosus* mire. Vegetation along the stream was therefore referred to M13c *Schoenus nigricans*-*Juncus subnodulosus*, *Caltha palustris*-*Galium uliginosum* sub-community, although it represents a species-poor form and lacks Black Bog-rush (*Schoenus nigricans*), one of the most characteristic species of this type of alkaline fen.

Atypical vegetation also occurred in the south-west of the site, appearing to mark a zone where water drains off a relatively flat mid-slope area. This had constant Bottle Sedge, Lesser Pond-sedge (*Carex acutiformis*), Marsh Valerian, Sharp-flowered Rush (*Juncus acutiflorus*), and Pointed Spear-moss (*Calliergonella cuspidata*) and Tall Thyme-moss. Blunt-flowered Rush was conspicuously absent from this zone, though dominating adjacent vegetation. This vegetation was referred to M9 *Carex rostrata*-*Calliergon cuspidatum/giganteum* mire, although this is a rare plant community in Oxfordshire, and it usually has a richer brown moss and small sedge component. However, M9 is characteristic of areas where water accumulates as flow tracks below seepage zones in fens. The atypical vegetation and absence of Blunt-flowered Rush from this zone may indicate a locally less base-rich groundwater source.

Sharp-flowered Rush was rare across the site but formed dense stands in two areas in the south-west. This vegetation was referred to M23a *Juncus acutiflorus/effusus*-*Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community. Blunt-flowered Rush was more-or-less absent from these zones, indicating local seepage of less base-rich groundwater.

### **Topogenous fen**

Wetland vegetation in the valley bottom was less complex and less diverse, dominated by Lesser Pond-sedge (*Carex acutiformis*), the dense stands of which were referred to S7 *Carex acutiformis* swamp, or by dense stands of Hard Rush, with tall herb species such as Marsh Thistle and Meadowsweet. Hard Rush-dominated vegetation was mostly referred to the Hard Rush-dominated form of M22. There was an extensive stand of this vegetation in the centre of the site (target note 20). In some areas Meadowsweet attained dominance, with stands referred to M27 *Filipendula ulmaria*-*Angelica sylvestris* mire.

## **3.3.2 Other habitats**

### **Grassland**

A diversity of types of grassland vegetation were recorded. The most extensive type of grassland comprised coarse, species-poor neutral grassland vegetation dominated by False Oat-grass (*Arrhenatherum elatius*), referred to MG1 *Arrhenatherum elatius* grassland. This was found on the higher ground along the northern boundary of the site (target note 1), and in a dry flat area toward the bottom of the valley in the centre of the site. Occasionally, there were stands of False Oat-grass grassland with a slightly richer assemblage of forbs such as Common Knapweed (*Centaurea nigra*), referred to MG1e *Arrhenatherum elatius* grassland, *Centaurea nigra* sub-community. However, large areas were comprised mostly of grasses and were classified as MG1a *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community.

Small stands of more forb-rich neutral grassland were found in the bottom of the valley and in narrow zones transitional to fen. These had species such as Lady's Bedstraw (*Galium verum*), and were referred to subcommunities of MG5 *Cynosurus cristatus*-*Centaurea nigra*



grassland. This vegetation appeared to be in more well-grazed areas, and / or areas where soils and hydrology limited the growth of ranker grasses.

Calcareous grassland was found in a well-marked zone across the mid-slope region of the valley, below neutral grassland and above fen vegetation. In the north of the site, this zone extended higher up the valley, around the head of the spring-fed stream there. Across the site, calcareous grassland vegetation was characterised by the dominance of Upright Brome (*Bromopsis erecta*), referred to sub-communities of CG3 *Bromus erectus* grassland. Most of such vegetation was coarse and species-poor, dominated by Upright Brome, and referred to CG3d *Bromus erectus* grassland, *Festuca rubra*-*Festuca arundinacea* sub-community. The shortest, most species-rich areas were located in zones just above fen vegetation (target notes 8 and 26), referred to CG3a *Bromus erectus* grassland, typical sub-community. Here the sward supported calcicolous grasses such Meadow Oat-grass (*Helictochloa pratensis*) and Quaking-grass, and a range of forbs, including Devil's-bit Scabious, Harebell, Salad Burnet (*Poterium sanguisorba*) and Spiny Restharrow. A greater area was occupied by less diverse vegetation intermediate between calcareous and neutral grassland, with frequent Common Knapweed, referred to CG3b *Bromus erectus* grassland, *Centaurea nigra* sub-community.

Within grassland across the flatter northern edge of the site were stands of Hard Rush not classified as fen. One stand of large, dense tussocks may have originated from heavy ground disturbance (target note 19), and coarse, grassy stands of dense Hard Rush in the north-east were mapped as MG10b *Juncus effusus*-*Holcus lanatus*, *Juncus inflexus* sub-community. To the south was also an area of vegetation with frequent Tufted Hair-grass (*Deschampsia cespitosa*), referred to MG9 *Deschampsia cespitosa*-*Holcus lanatus* grassland. These wetter neutral grassland plant communities likely mark areas of impeded drainage rather than groundwater influence.

### Scrub

To the north, north-east and south-west the site was bounded by hedgerows, mostly of Hawthorn (*Crataegus monogyna*). The former hedgerow along the south-western boundary had grown out into the site, comprising a wide strip of Blackthorn (*Prunus spinosa*) and Hawthorn, with a mantle of Elm-leaved Bramble (*Rubus ulmifolius*). Scrub was referred to W21 *Crataegus monogyna*-*Hedera helix* scrub, W22 *Prunus spinosa*-*Rubus fruticosus* scrub or W24 *Rubus fruticosus*-*Holcus lanatus* underscrub, according to dominant species. Sub-communities of these plant communities were not recorded.

Within the site boundary, on dry ground were scattered bushes of Hawthorn and small stands of bramble, and there was a large stand of Field Rose (*Rosa arvensis*) in the centre of the site, mapped as the *ad hoc* unit 'Rosa arvensis scrub'. Scrub in wetland areas was limited in extent, with a few scattered bushes of Grey Willow (*Salix cinerea*), largely in the south-west of the site, and limbs of Crack Willow (*Salix x euxina*) that had fallen into the site from along the Cockley Brook (mapped as the underlying vegetation).

### Woodland

Woodland was present along the Cockley Brook and as a stand of wet woodland along the tributary stream in the south-west. The stand of mixed scrub and woodland along the Brook was not accessed and plant communities were not mapped. The wet woodland in the south-west of the site comprised a low canopy of young Grey Willow, with a field layer dominated by Common Reed (*Phragmites australis*) and Lesser Pond-sedge (target notes 30 and 31). This vegetation was referred to W5a *Alnus glutinosa*-*Carex paniculata*, *Phragmites australis* sub-community.

## 4 Discussion and recommendations

### 4.1 Habitats of nature conservation value

The survey mapped 1.5 ha of lowland fens priority habitat, approximately 30 % of unit 1 of the SSSI. Fen habitat included the plant communities M22 *Juncus subnodulosus*-*Cirsium palustre* fen meadow and M23 *Juncus acutiflorus/effusus*-*Galium palustre* rush-pasture, which are listed as features of the SSSI. M22 was the most extensive, covering approximately 1 ha. Only a small area of M23 was recorded. Other vegetation types were also classified as lowland fens, such as S7 *Carex acutiformis* swamp, although these were of less botanical interest.

Of particular interest was the fen vegetation along the spring-fed stream in the north of the site, referred in this survey to M13 *Schoenus nigricans*-*Juncus subnodulosus* mire. Although not typical of this plant community, this habitat was clearly an example of the Annex 1 habitat alkaline fen, showing tufa formation and supporting a suite of typical alkaline fen plant species, i.e. Blunt-flowered Rush, Bottle Sedge, Curled Hookmoss, Long-stalked Yellow-sedge and Purple Moor-grass. Alkaline fen habitat has not previously been recorded from the SSSI, e.g. in Natural England's inventory of alkaline fen sites (Natural England, 2023).

The plant community M9 *Carex rostrata*-*Calliergon cuspidatum/giganteum* mire, is also often regarded as a type of alkaline fen vegetation, but the stand identified during the survey was not considered to represent alkaline fen habitat, lacking typical plant species and other features of alkaline fen.

In addition to wetland habitat, 0.5 ha of lowland calcareous grassland and 0.1 ha of lowland meadows priority habitats were recorded. Calcareous grassland is not listed as a feature of the SSSI, even though stands of calcareous grassland were the most botanically rich areas within the site. This habitat is also an Annex 1 habitat ('6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)'). The neutral grassland plant community MG5 *Cynosurus cristatus*-*Centaurea nigra* grassland recorded during the survey is listed as a feature of the SSSI, but examples within the site were of limited extent and were of no especial botanical interest.

### 4.2 Habitat management recommendations

The favourable condition of the fen SSSI feature within the unit is dependent on regular removal of biomass, either by grazing or mowing (McBride, 2011). Without this disturbance, fen vegetation becomes coarse and species-poor, as seen across the site. The condition of the vegetation seen during the survey suggests that, despite the presence of cattle, fen vegetation is ungrazed or very under-grazed. Although it is positive that such a diversity of wetland plants remains at the site, including several notable species, all had very small populations. In a well-managed fen, small plants such as Carnation Sedge, Long-stalked Yellow-sedge, Marsh Arrowgrass and Marsh Valerian should be much more abundant.

With approximately 1.5 times as much grassland as fen within the site, there is little inducement for animals to graze the very coarse forage in fen areas. During the survey, cattle were seen in areas of fen, but they appeared to be sheltering and cooling off rather than grazing. Fen vegetation would be most palatable in spring and early summer, but at the time of the survey (mid-July), cattle appeared to have arrived only recently. Even if livestock were on site earlier, grass in dry areas would need to be limited to promote grazing of wet areas.

Grassland vegetation was also under-grazed. The extensive areas of neutral grassland were species-poor, coarse and grass-dominated. The most botanically diverse areas of

calcareous grassland were likely in areas with shallower soils, limiting the growth of coarser species and maintaining species-rich vegetation.

To improve the species and structural diversity of the fen and other habitats across unit 1 of the SSSI, the following are recommended:

- Mow areas of fen vegetation and remove cuttings from site. The objective of mowing is to create more open conditions for more diverse vegetation to establish and make the vegetation more palatable to grazing animals. The work would need to be done by a specialist contractor on foot; ground conditions would not be suitable for vehicles. The first year an area is cut, the first cut should be in April, with a further cut in summer and again in late summer or early autumn. The work could be carried out in phases, to minimise annual disturbance across the site.
- Graze the grassland over winter, e.g. with sheep, and turn out cattle in the spring.

It is assumed that it will not be possible to keep cattle on-site year-round on such a small site. However, if the unit could be grazed with hardy stock, or managed as part of a larger grazing area, then this could be possible. A joined-up approach to grazing would also benefit unit 2 of the SSSI, most of which is also not grazed.

Freshwater Habitats Trust, through the Oxfordshire Fens Project, can support the landowner, land managers and Natural England to implement the above recommendations and enhance the site for wetland and other biodiversity.

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## Appendix 1 Plant records

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**Table 2** List of plant species recorded

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
Liverworts				
<i>Pellia endiviifolia</i>	Endive Pellia	-	R	-
Mosses				
<i>Brachythecium rivulare</i>	River Feathermoss	-	-	-
<i>Calliergonella cuspidata</i>	Pointed Sparmoss	-	P	-
<i>Cratoneuron filicinum</i>	Fern-leaved Hookmoss	-	-	-
<i>Palustriella commutata</i>	Curled Hookmoss	-	R	-
<i>Plagiomnium elatum</i>	Tall Thyme-moss	-	R	-
<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss	-	-	-
<i>Pohlia melanodon</i>	Pink-fruited Thread-moss	-	-	-
Ferns and horsetails				
<i>Equisetum arvense</i>	Field Horsetail	-	-	-
<i>Equisetum fluviatile</i>	Water Horsetail	-	P	E
<i>Equisetum palustre</i>	Marsh Horsetail	-	P	E
Flowering plants				
<i>Acer campestre</i>	Field Maple	-	-	-
<i>Achillea millefolium</i>	Yarrow	-	-	-
<i>Agrimonia eupatoria</i>	Agrimony	-	-	-
<i>Agrostis capillaris</i>	Common Bent	-	-	-

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Agrostis stolonifera</i>	Creeping Bent	-	-	E
<i>Ajuga reptans</i>	Bugle	-	-	-
<i>Alopecurus pratensis</i>	Meadow Foxtail	-	-	-
<i>Angelica sylvestris</i>	Wild Angelica	-	P	E
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	-	-	-
<i>Anthriscus sylvestris</i>	Cow's Parsley	-	-	-
<i>Arrhenatherum elatius</i>	False Oat-grass	-	-	-
<i>Bellis perennis</i>	Common Daisy	-	-	-
<i>Brachypodium sylvaticum</i>	False Brome	-	-	-
<i>Briza media</i>	Quaking-grass	England Near Threatened	-	-
<i>Bromopsis erecta</i>	Upright Brome	-	-	-
<i>Bromus hordeaceus</i>	Soft Brome	-	-	-
<i>Caltha palustris</i>	Marsh-marigold	-	P	E
<i>Campanula rotundifolia</i>	Harebell	England Near Threatened	-	-
<i>Cardamine flexuosa</i>	Wavy Bitter-cress	-	-	-
<i>Cardamine pratensis</i>	Cuckoo Flower	-	-	E
<i>Carduus nutans</i>	Musk Thistle	-	-	-
<i>Carex acutiformis</i>	Lesser Pond-sedge	-	P	E
<i>Carex distans</i>	Distant Sedge	Oxon Scarce	R	E

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Carex disticha</i>	Brown Sedge	-	P	E
<i>Carex flacca</i>	Glaucous Sedge	-	-	E
<i>Carex lepidocarpa</i>	Long-stalked Yellow-sedge	Oxon Scarce	P	E
<i>Carex nigra</i>	Common Sedge	-	P	E
<i>Carex otrubae</i>	False Fox-sedge	-	P	E
<i>Carex panicea</i>	Carnation Sedge	-	P	E
<i>Carex rostrata</i>	Bottle Sedge	Oxon Scarce	P	E
<i>Carex sylvatica</i>	Wood-sedge	-	-	-
<i>Centaurea nigra</i>	Common Knapweed	-	-	-
<i>Cerastium fontanum</i>	Common Mouse-ear	-	-	E
<i>Chenopodium album</i>	Fat-hen	-	-	-
<i>Circaea lutetiana</i>	Enchanter's Nightshade	-	-	-
<i>Cirsium acaule</i>	Dwarf Thistle	-	-	-
<i>Cirsium arvense</i>	Creeping Thistle	-	-	-
<i>Cirsium eriophorum</i>	Woolly Thistle	-	-	-
<i>Cirsium palustre</i>	Marsh Thistle	-	P	E
<i>Cirsium vulgare</i>	Spear Thistle	-	-	-
<i>Convolvulus arvensis</i>	Field Bindweed	-	-	-
<i>Corylus avellana</i>	Hazel	-	-	-
<i>Crataegus monogyna</i>	Hawthorn	-	-	-



Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Crepis capillaris</i>	Smooth Hawk's-beard	-	-	-
<i>Cynosurus cristatus</i>	Crested Dog's-tail	-	-	-
<i>Dactylis glomerata</i>	Cock's-foot	-	-	-
<i>Dactylorhiza fuchsii</i>	Common Spotted-orchid	-	P	-
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	-	-	E
<i>Elymus repens</i>	Common Couch	-	-	-
<i>Epilobium hirsutum</i>	Great Willowherb	-	P	E
<i>Epilobium parviflorum</i>	Hoary Willowherb	-	P	E
<i>Festuca rubra</i>	Red Fescue	-	-	-
<i>Filipendula ulmaria</i>	Meadowsweet	-	P	E
<i>Fraxinus excelsior</i>	Ash	-	-	-
<i>Galium aparine</i>	Cleavers	-	-	-
<i>Galium palustre</i>	Marsh-bedstraw	-	P	E
<i>Galium uliginosum</i>	Fen Bedstraw	-	P	E
<i>Galium verum</i>	Lady's Bedstraw	-	-	-
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	-	-	-
<i>Geranium robertianum</i>	Herb-Robert	-	-	-
<i>Geum urbanum</i>	Wood Avens	-	-	-
<i>Glechoma hederacea</i>	Ground-ivy	-	-	-
<i>Glyceria fluitans</i>	Floating Sweet-grass	-	-	E

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Glyceria notata</i>	Plicate Sweet-grass	-	P	E
<i>Hedera helix</i>	Ivy	-	-	-
<i>Helictochloa pratensis</i>	Meadow Oat-grass	-	-	-
<i>Helosciadium nodiflorum</i>	Fool's-water-cress	-	-	E
<i>Heracleum sphondylium</i>	Hogweed	-	-	-
<i>Holcus lanatus</i>	Yorkshire-fog	-	-	-
<i>Hordeum secalinum</i>	Meadow Barley	-	-	-
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	England Near Threatened	P	E
<i>Hypericum perforatum</i>	Perforate St John's-wort	-	-	-
<i>Hypericum tetrapterum</i>	Square-stalked St John's-wort	-	P	-
<i>Hypochaeris radicata</i>	Cat's-ear	-	-	-
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	-	P	E
<i>Juncus articulatus</i>	Jointed Rush	-	P	E
<i>Juncus bufonius</i>	Toad Rush	-	-	E
<i>Juncus effusus</i>	Soft Rush	-	P	E
<i>Juncus inflexus</i>	Hard Rush	-	-	E
<i>Juncus subnodulosus</i>	Blunt-flowered Rush	-	R	E
<i>Lathyrus pratensis</i>	Meadow Vetchling	-	-	-
<i>Lemna gibba</i>	Fat Duckweed	-	-	F
<i>Leontodon hispidus</i>	Rough Hawkbit	-	-	-

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Leucanthemum vulgare</i>	Oxeye Daisy	-	-	-
<i>Ligustrum vulgare</i>	Wild Privet	-	-	-
<i>Linum catharticum</i>	Fairy Flax	-	-	-
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil	-	-	-
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil	-	P	E
<i>Lysimachia nummularia</i>	Creeping Jenny	-	-	E
<i>Medicago lupulina</i>	Black Medick	-	-	-
<i>Mentha aquatica</i>	Water Mint	-	P	E
<i>Molinia caerulea</i>	Purple Moor-grass	Oxon Scarce	P	E
<i>Myosotis arvensis</i>	Field Forget-me-not	-	-	-
<i>Myosotis scorpioides</i>	Water Forget-me-not	-	P	E
<i>Odontites vernus</i>	Red Bartsia	-	-	-
<i>Ononis spinosa</i>	Spiny Restharrow	England Near Threatened	-	-
<i>Persicaria amphibia</i>	Amphibious Bistort	-	-	E
<i>Phalaris arundinacea</i>	Reed Canary-grass	-	P	E
<i>Phleum bertolonii</i>	Smaller Cat's-tail	-	-	-
<i>Phleum pratense</i>	Timothy	-	-	-
<i>Phragmites australis</i>	Common Reed	-	P	E
<i>Pimpinella saxifraga</i>	Burnet-saxifrage	-	-	-
<i>Plantago lanceolata</i>	Ribwort Plantain	-	-	-

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Plantago media</i>	Hoary Plantain	England Near Threatened	-	-
<i>Poa trivialis</i>	Rough Meadow-grass	-	-	-
<i>Potentilla anserina</i>	Silverweed	-	-	-
<i>Potentilla erecta</i>	Tormentil	England Near Threatened	-	E
<i>Potentilla reptans</i>	Creeping Cinquefoil	-	-	-
<i>Poterium sanguisorba</i>	Salad Burnet	-	-	-
<i>Primula veris</i>	Cowslip	-	-	-
<i>Prunella vulgaris</i>	Self-heal	-	-	-
<i>Prunus spinosa</i>	Blackthorn	-	-	-
<i>Quercus robur</i>	English Oak	-	-	-
<i>Ranunculus acris</i>	Meadow Buttercup	-	-	-
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	-	-	-
<i>Ranunculus repens</i>	Creeping buttercup	-	-	-
<i>Rosa arvensis</i>	Field-rose	-	-	-
<i>Rubus caesius</i>	Dewberry	-	-	-
<i>Rubus ulmifolius</i>	Elm-leaf Blackberry	-	-	-
<i>Rumex acetosa</i>	Common Sorrel	-	-	-
<i>Rumex conglomeratus</i>	Clustered Dock	-	-	-
<i>Rumex obtusifolius</i>	Broad-leaved Dock	-	-	-

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Rumex sanguineus</i>	Wood Dock	-	-	-
<i>Salix cinerea</i>	Grey Willow	-	P	-
<i>Salix cinerea x aurita</i> = <i>S. x multinervis</i>	Hybrid Willow	-	-	-
<i>Salix euxina x alba</i> = <i>S. x fragilis</i>	Crack-willow	-	-	-
<i>Sambucus nigra</i>	Elder	-	-	-
<i>Schedonorus arundinaceus</i>	Tall Fescue	-	-	-
<i>Schedonorus giganteus</i>	Giant Fescue	-	-	-
<i>Scorzoneroide autumnalis</i>	Autumn Hawkbit	-	-	-
<i>Scrophularia auriculata</i>	Water Figwort	-	P	E
<i>Silene flos-cuculi</i>	Ragged-Robin	England Near Threatened	P	-
<i>Solanum dulcamara</i>	Bittersweet	-	-	E
<i>Sonchus asper</i>	Prickly Sow-thistle	-	-	-
<i>Stellaria alsine</i>	Bog Stitchwort	-	P	-
<i>Succisa pratensis</i>	Devil's-bit Scabious	England Near Threatened	-	-
<i>Tamus communis</i>	Black Bryony	-	-	-
<i>Taraxacum</i> agg.	A dandelion	-	-	-
<i>Torilis japonica</i>	Upright Hedge-parsley	-	-	-
<i>Tragopogon pratensis</i>	Goat's-beard	-	-	-
<i>Trifolium campestre</i>	Lesser Trefoil	-	-	-

Scientific name	Common name	Conservation status	Principal (P) / rare (R) fen species	Aquatic, Submerged (S) / Floating (F) / Emergent (E) species
<i>Trifolium pratense</i>	Red Clover	-	-	-
<i>Trifolium repens</i>	White Clover	-	-	-
<i>Triglochin palustris</i>	Marsh Arrowgrass	England Near Threatened	P	E
<i>Trisetum flavescens</i>	Yellow Oat-grass	-	-	-
<i>Urtica dioica</i>	Nettle	-	-	-
<i>Valeriana dioica</i>	Marsh Valerian	England Near Threatened	P	E
<i>Veronica beccabunga</i>	Brooklime	-	-	E
<i>Veronica chamaedrys</i>	Germander Speedwell	-	-	-
<i>Vicia cracca</i>	Tufted Vetch	-	-	-

**Table 3** Species / grid reference records

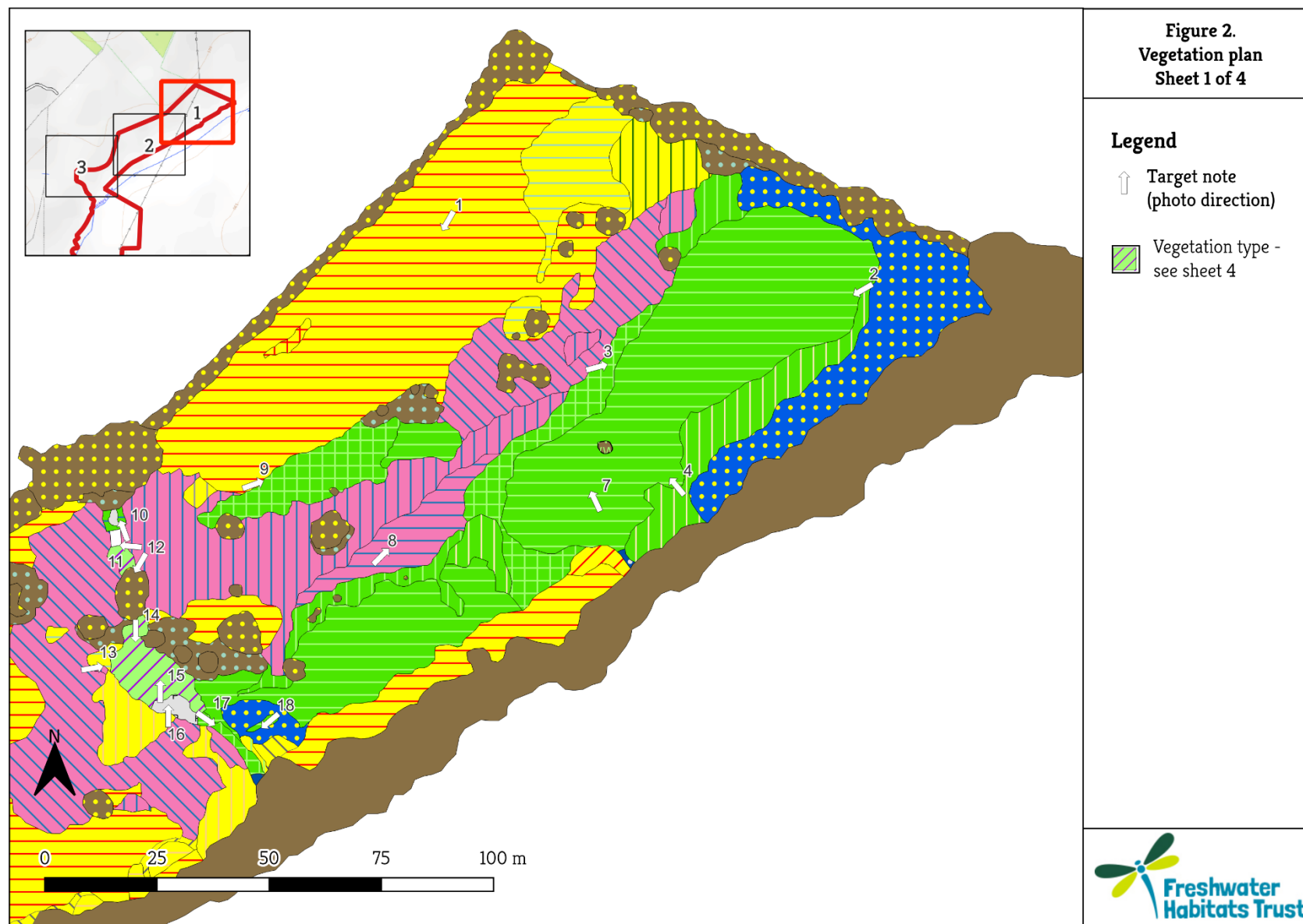
Scientific name	Grid reference
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<i>Carex distans</i>	SP 44607 26626
<i>Carex distans</i>	SP 44326 26430
<i>Carex lepidocarpa</i>	SP 44554 26589
<i>Carex panicea</i>	SP 44326 26430
<i>Carex rostrata</i>	SP 44281 26418

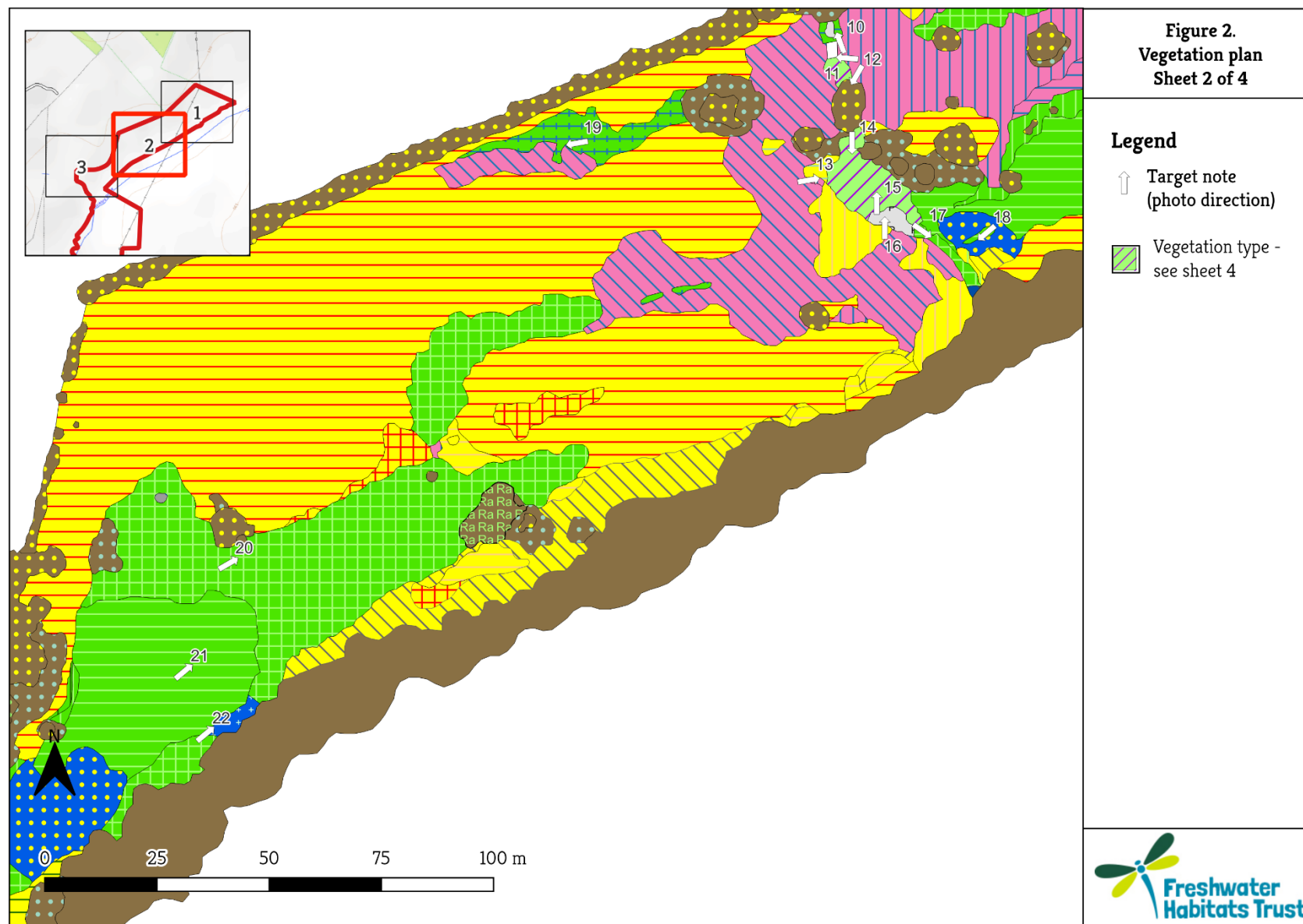
Scientific name	Grid reference
<i>Hydrocotyle vulgaris</i>	SP 44678 26669
<i>Molinia caerulea</i>	SP 44660 26664
<i>Molinia caerulea</i>	SP 44534 26632
<i>Ononis spinosa</i>	SP 44535 26607
<i>Palustriella commutata</i>	SP 44554 26589
<i>Potentilla erecta</i>	SP 44607 26626
<i>Triglochin palustris</i>	SP 44534 26632
<i>Valeriana dioica</i>	SP 44678 26669
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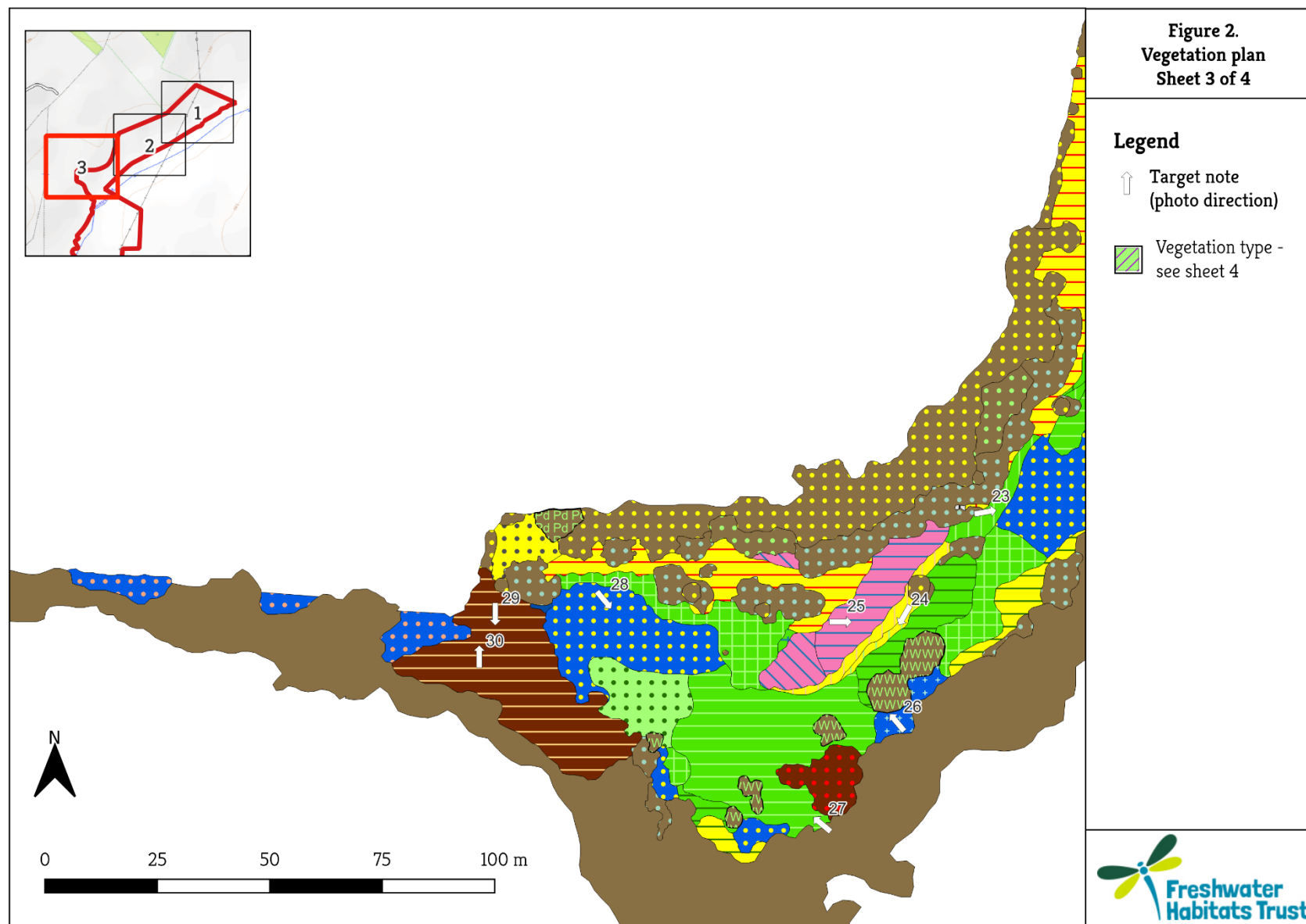
## Appendix 2 Vegetation and habitat plans

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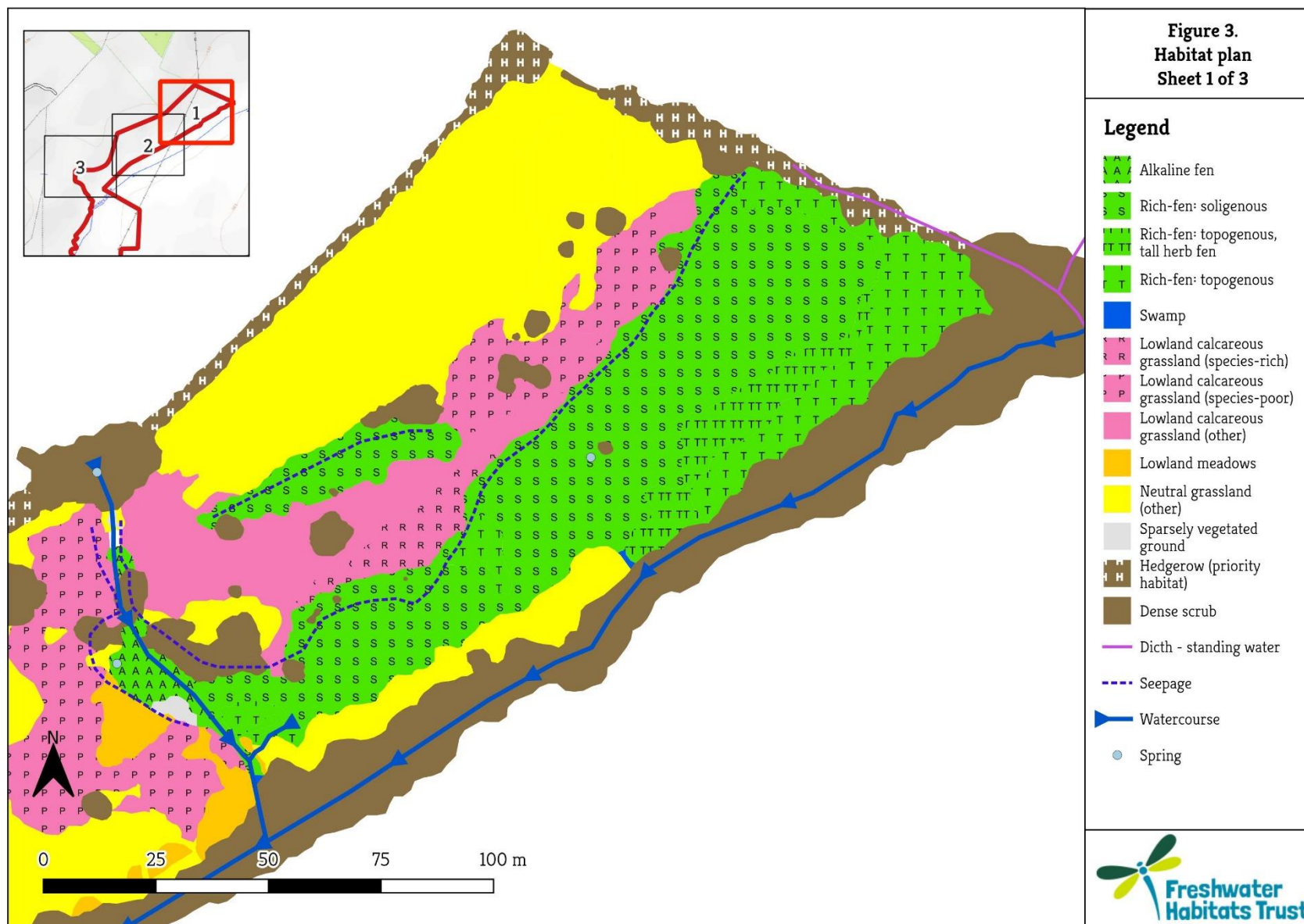




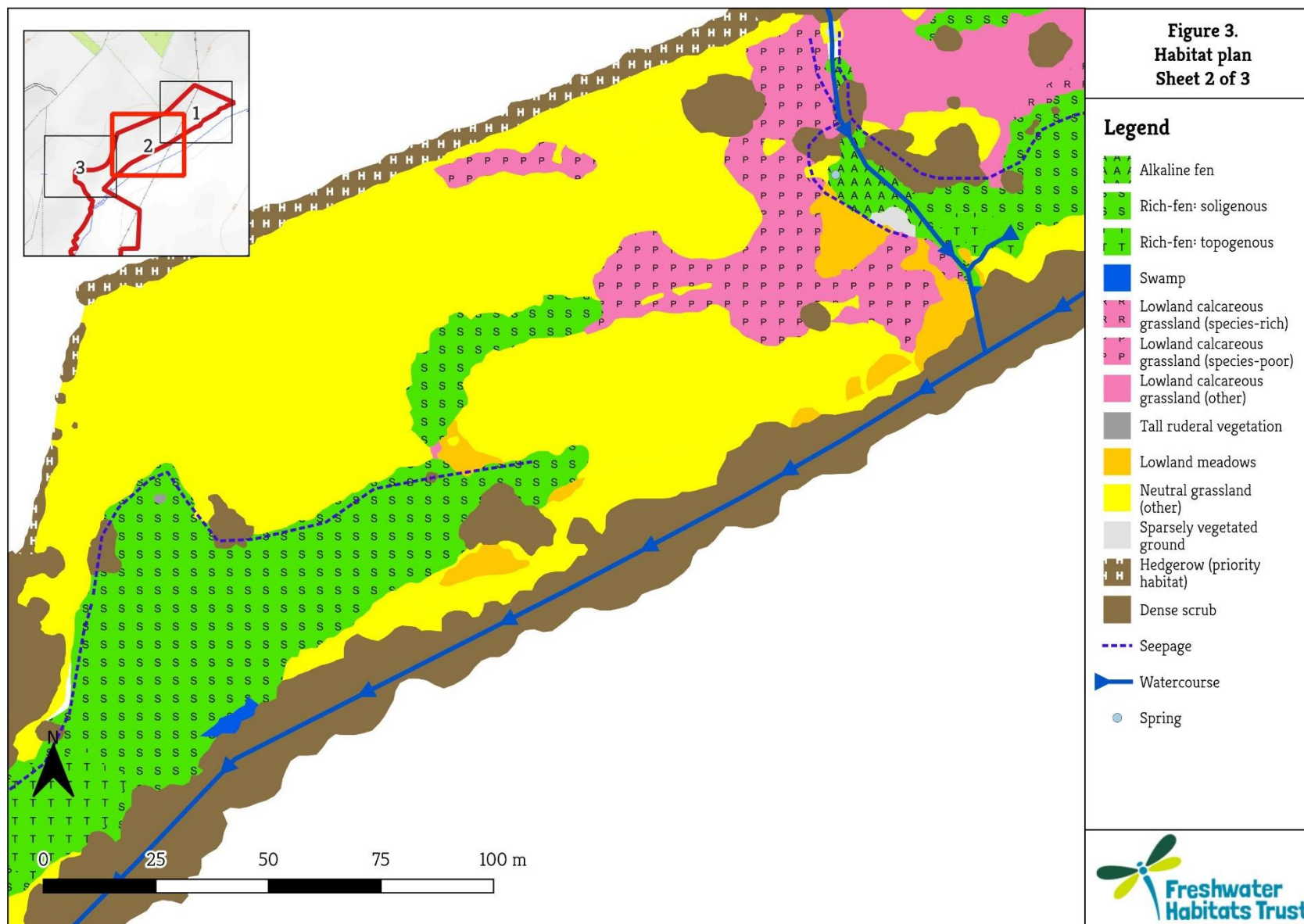
## Legend to vegetation

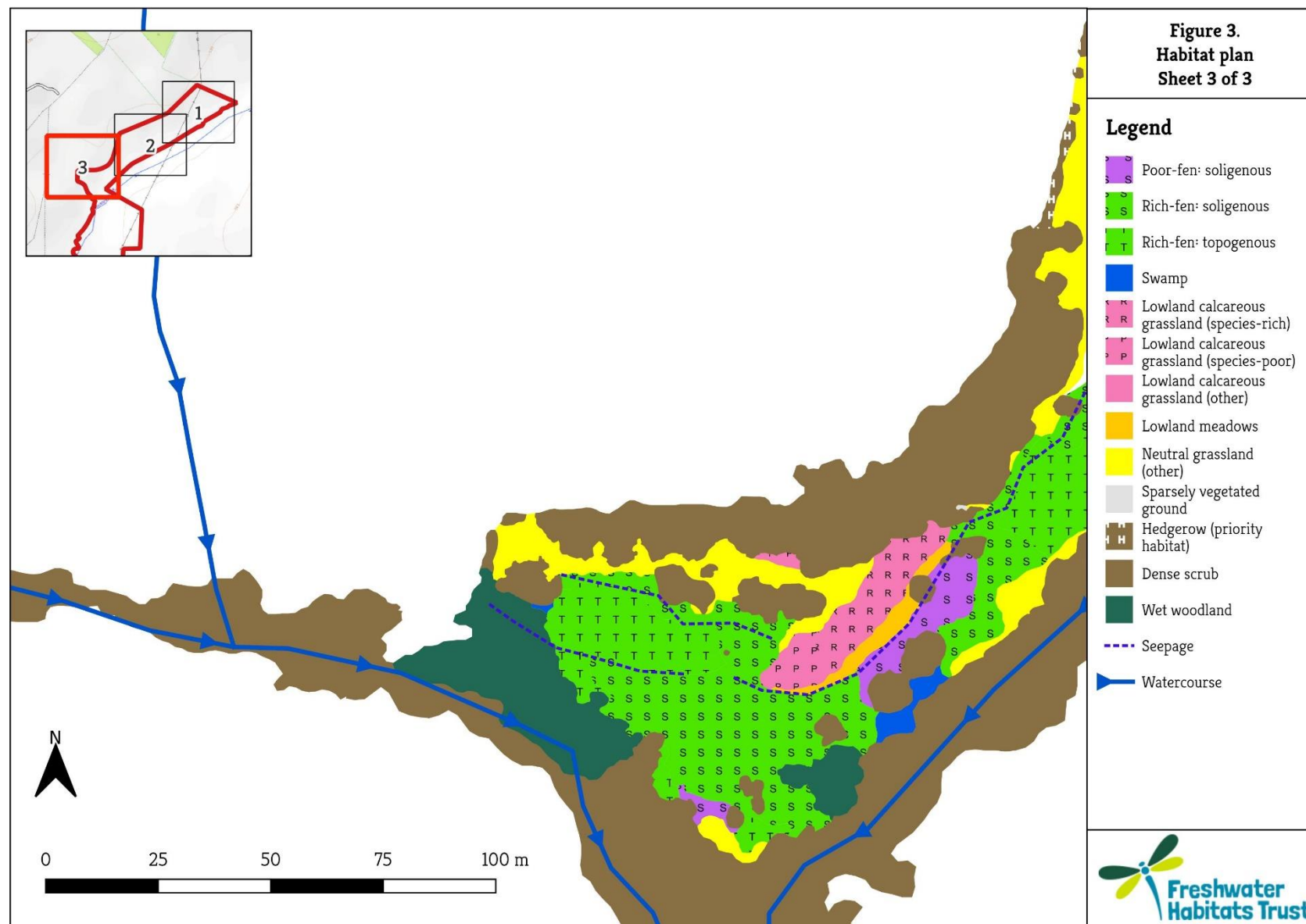
	Bridge		MG1c Arrhenatherum elatius grassland, Filipendula ulmaria sub-community		S22 Glyceria fluitans water-margin vegetation
	M9 Carex rostrata-Calliergon cuspidatum/giganteum mire		MG1e Arrhenatherum elatius grassland, Centaurea nigra sub-community		S23 Other water-margin vegetation
	M13c Schoenus nigricans-Juncus subnodulosus mire, Caltha palustris-Galium uliginosum sub-community		MG5a Cynosurus cristatus-Centaurea nigra grassland, Lathyrus pratensis sub-community		OV26 Epilobium hirsutum community
	M22 Juncus inflexus dominated		MG5b Cynosurus cristatus-Centaurea nigra grassland, Galium verum sub-community		Poached ground
	Juncus inflexus-dominated vegetation		MG6b Lolium perenne-Cynosurus cristatus grassland, Anthoxanthum odoratum sub-community		Bare/disturbed ground
	M22a Juncus subnodulosus-Cirsium palustre fen-meadow, typical sub-community		MG7 Lolium perenne leys and related grasslands		W21 Crataegus monogyna-Hedera helix scrub
	M22b Juncus subnodulosus-Cirsium palustre fen-meadow, Briza media-Trifolium spp. sub-community		MG7c Lolium perenne leys and related grasslands, Lolium perenne-Alopecurus pratensis-Festuca pratensis grassland		W22 Prunus spinosa-Rubus fruticosus scrub
	M23a Juncus effusus/acetiflorus-Galium palustre rush-pasture, Juncus acetiflorus sub-community		MG7d Lolium perenne leys and related grasslands, Lolium perenne-Alopecurus pratensis grassland		W24 Rubus fruticosus-Holcus lanatus underscrub
	M23b Juncus effusus/acetiflorus-Galium palustre rush-pasture, Juncus effusus sub-community		MG8b Cynosurus cristatus-Carex panicea-Caltha palustris grassland, typical sub-community		Prunus domestica scrub
	M27b Filipendula ulmaria-Angelica sylvestris mire, Urtica dioica-Vicia cracca sub-community		MG9a Holcus lanatus-Deschampsia cespitosa grassland, Poa trivialis sub-community		Rosa arvensis scrub
	CG3a Bromus erectus grassland, typical sub-community		MG9b Holcus lanatus-Deschampsia cespitosa grassland, Arrhenatherum elatius sub-community		Willow scrub
	CG3b Bromus erectus grassland, Centaurea nigra sub-community		MG10b Holcus lanatus-Juncus effusus rush-pasture, Juncus inflexus sub-community		Dense scrub
	CG3d Bromus erectus grassland, Festuca rubra-Festuca arundinacea sub-community		Glyceria notata dominated vegetation		W1 Salix cinerea-Galium palustre woodland
	MG1a Arrhenatherum elatius grassland, Festuca rubra sub-community		S4 Phragmites australis swamp and reed-beds		W5a Alnus glutinosa-Carex paniculata woodland, Phragmites australis sub-community
	MG1b Arrhenatherum elatius grassland, Urtica dioica sub-community		S7 Carex acutiformis swamp		Dense scrub/woodland

**Figure 2.**  
**Vegetation plan**  
**Sheet 4 of 4**











## Appendix 3 Target notes


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Table 4 Target notes recorded

#	Description	Photograph
1	Rank species-poor grassland across flat ground at top of valley, dominated by <i>Arrhenatherum elatius</i> , with frequent <i>Cirsium arvense</i> .	
2	Zonation of vegetation across valley, seen from bottom of valley in north-east corner of SSSI unit. Looking across lower zone with abundant <i>Carex acutiformis</i> to zone dominated by <i>Juncus subnodulosus</i> further up slope, and grassland on slopes above.	



#	Description	Photograph
3	Zonation across lower part of valley. Photo shows contact zone between grassland and fen in the immediate foreground; intermediate seepage dominated by <i>Juncus inflexus</i> ; wet zone of <i>Juncus subnodulosus</i> dominated fen; and furthest from seepage zone, in valley bottom, extensive stand of <i>Carex acutiformis</i> , grading laterally from vegetation with codominance of <i>Juncus</i> and <i>Carex</i> , to <i>Carex</i> -dominance.	
4	View upslope of vegetation pattern across valley.	



#	Description	Photograph
7	Area around springhead, dominated by <i>Juncus subnodulosus</i> , forming quaking mat. Few other species present.	
8	Area of short, species-rich calcareous grassland in lower part of slope. Zone with frequent to locally abundant <i>Succisa pratensis</i> , a well-developed and diverse grassland-fen transition zone, with <i>Carex distans</i> and <i>Potentilla erecta</i> .	




#	Description	Photograph
9	Grassy stand of <i>Juncus inflexus</i> dominated vegetation in perched seepage zone. To the east, below the break in slope, is an abrupt transition to a stand of <i>Juncus subnodulosus</i> .	
10	Watercourse upstream of small bridge, poached by cattle.	



#	Description	Photograph
11	Watercourse downstream of bridge. The banks support extensive patches of the tufa-forming moss <i>Palustriella commutata</i> . The right bank, immediately next to the bridge supports a population of <i>Triglochin palustris</i> .	
12	<i>Molinia caerulea</i> growing on banks of watercourse.	



#	Description	Photograph
13	Steep bank above stream, with species-rich calcareous grassland with abundant <i>Ononis spinosa</i> .	
14	Vegetation along watercourse, dominated by <i>Juncus inflexus</i> and <i>Juncus subnodulosus</i> . Photo shows stands of <i>Carex rostrata</i> growing in watercourse.	



#	Description	Photograph
15	Watercourse and flanking fen vegetation, with abundant tufa and <i>Palustriella commutata</i> .	
16	Sparsely vegetated poached ground where livestock access stream	



#	Description	Photograph
17	Open vegetation in lower part of watercourse, with abundant <i>Glyceria notata</i> and small wetland plants of bare mud.	
18	Flow through sedge-dominated fen, marked out by open vegetation with abundant <i>Juncus subnodulosus</i> . Flow accumulates from seepage from the slope to the north and north-east flows into small watercourse to west. Small amount of <i>Palustriella commutata</i> growing among <i>Juncus</i> .	



#	Description	Photograph
19	Stand of species-poor <i>Juncus inflexus</i> at top of slope, perhaps created by previous disturbance.	
20	Extensive stand of <i>Juncus inflexus</i> dominated fen in valley bottom, with abundant <i>Filipendula ulmaria</i> . Appears to be under-grazed.	



#	Description	Photograph
21	Seepage fen, dominated by <i>Juncus subnodulosus</i> , with vegetation lodged in flatter area below break in slope. Photo shows transition to zone of <i>Juncus inflexus</i> and <i>Filipendula ulmaria</i> dominated fen, in lower part of valley bottom, further from seepage zone (right, middle distance).	
22	Area at bottom of valley, forming diffuse outflow for area of seepage fen upslope. Vegetation dominated by <i>Glyceria notata</i> .	



#	Description	Photograph
23	Valley bottom in 'watershed' area between two seepage zones, with vegetation dominated by <i>Carex acutiformis</i> . Wet grassland in foreground of photo forms contact community between upslope grassland and area of seepage to right, out of image.	
24	Zonation across grassland to fen ecotone associated with presumed limestone outcrop. From right to left of photo: upper right, species-rich calcareous grassland with abundant <i>Bromopsis erecta</i> (CG3); narrow, shortly-grazed zone of neutral grassland (MG5b); in middle of photo, intermediate zone of wet grassland (MG8b); finally, seepage fen dominated by rushes, here <i>Juncus acutiflorus</i> (M23a).	




#	Description	Photograph
25	Calcareous grassland on slope of presumed limestone outcrop. Images show short, species-rich vegetation in eastern half of outcrop, and ranker, poorer vegetation in western.	
26	Shaded area at bottom of valley below zone of seepage fen, with vegetation dominated by <i>Glyceria notata</i> , forming quaking rafts over very wet ground.	



#	Description	Photograph
27	Bottom of valley, with vegetation dominated by <i>Juncus subnodulosus</i> , much of it lodged. Scattered bushes of <i>Salix cinerea</i> .	
28	Zonation of fen vegetation from top to bottom of valley, comprising <i>Juncus inflexus</i> dominated on slope zone at top of seepage area, to zone of <i>Carex acutiformis</i> in flatter mid-slope area, and <i>Juncus subnodulosus</i> zone in lower part of valley.	



#	Description	Photograph
29	Wet woodland dominated by low canopy of <i>Salix cinerea</i> , over field layer of <i>Carex acutiformis</i> and <i>Phragmites australis</i> .	
30	Iron-rich seepage visible under trees	