



Vuggles and Buckham Hill: Sutton Hall, East Sussex

River Ouse Project Report No. 4

Centre for Community Engagement
University of Sussex



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Front cover Buckham Hill Brook looking south, showing Ditch 2 and harrowed wildflower area, November 2011 (*Photo: John Prodger*).

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1 Introduction

This is one of series of reports produced by the University of Sussex River Ouse Project about MORPH (Middle Ouse Restoration of Physical Habitat) sites. The reports provide information to the Environment Agency, the National Trust and other interested stakeholders to enable appropriate decisions to be made about biodiversity enhancement of riverside land in the Middle Ouse linked to flood alleviation. In this report, Middle Ouse refers to the Ouse and its tributaries in the area defined as Middle Ouse by MORPH (Environment Agency, 2011).

Our work has focussed particularly on streamside grassland. The two main objectives were to discover more about species-rich sites and to assess the suitability of species-poor sites for either grassland enhancement or wet woodland restoration.

The report sets our work in context and describes the methods we used (Section 2 and 3). A site description (Section 4) includes details of the frequency of flooding and potential for the site to act as a flash washland. Relevant changes in land use over the last 200 years are detailed in Section 5. Section 6 describes present-day vegetation with notable species and an indication of biodiversity value, while proposals for biodiversity enhancement that could be linked to flood alleviation are given in Section 7.

2 Context

2.1 A washland flood alleviation strategy

The river Ouse in Sussex is a flashy river, which rises quickly after prolonged heavy rain and then soon subsides. It has a wide catchment area with a large number of small streams, many of which become dry in their upper reaches during summer (Figure 1). This capillary system is mostly well-wooded with imperfect or poor-draining soils; mini-floodplains alternate with steep-sided sections of ghyll. Rain falling at the end of a dry period is absorbed initially but, once the ground becomes saturated, any extra rainfall causes rapid flows in these streams. The result is a sudden and dramatic rise in water level in the main Ouse. In the past, this water spilled on to land bordering the Middle Ouse resulting in flooding, which lasted 2-3 days. Land subject to such flooding is known as 'flash washland'. Navigation works between 1790 and 1799 on the main Ouse and the deepening of Ouse streams in the 1970s to drain agricultural land have reduced the amount of land subject to this 'flash' flooding – leading to destructive flooding of homes and businesses further down the river.

A flood alleviation strategy for the Ouse depends on holding back the peak flow temporarily in the upper regions until water from lower down the system has passed through. Flash washlands, which flood briefly and then drain quickly, are ideal because they soon become available to store water again. Such a naturally functioning system is better for biodiversity and inexpensive compared with hard structures and sluice gates.

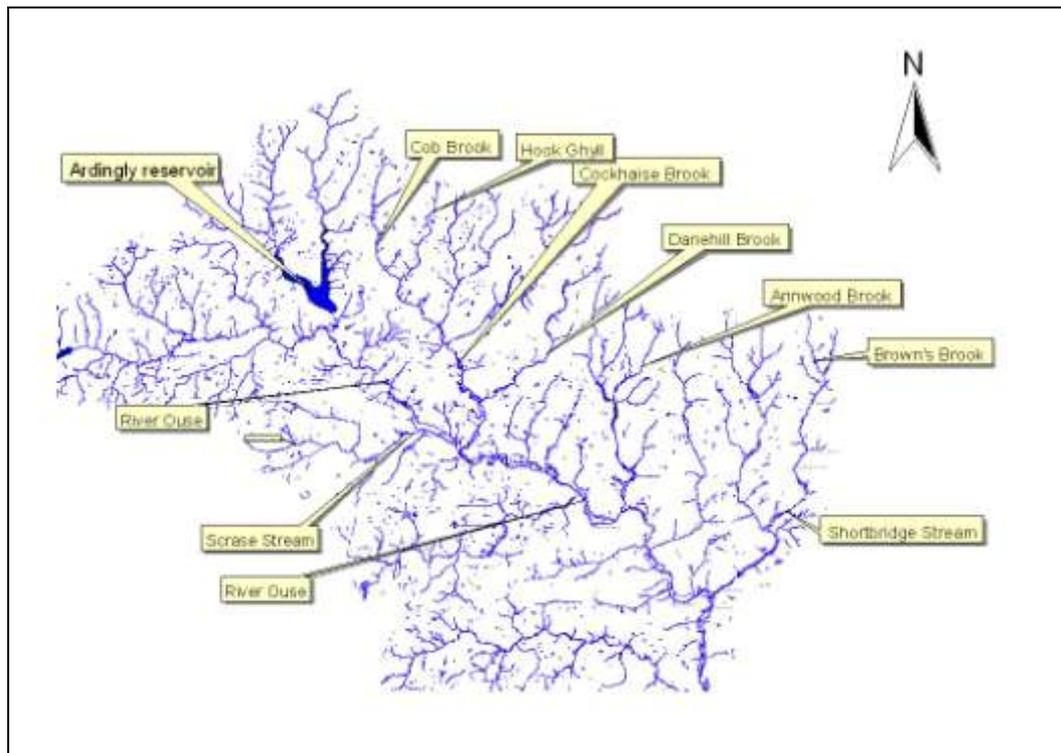


Figure 1. The stream system that feeds into the upper reaches of the river Ouse.

2.2 Flash washlands in the Middle Ouse

Flash washlands in the Middle Ouse share the following properties.

- They flood for 2–3 days during periods of peak flow after heavy and prolonged rain, usually during winter.
- They have free-draining soil as a result of the sandy silt brought down in floodwaters from the High Weald.
- They were managed as hay-meadows with flower-rich ‘Crested Dog’s-tail–Common Knapweed Grassland’ (MG5 grassland in the National Vegetation Classification – see section 3.1). Such grassland tolerates short duration flooding.
- They are too dry for most of the year to support wetland plants unless they contain permanently wet areas fed by springs.
- Washlands with a matrix of spring-fed wetland areas within MG5 grassland are the most biodiverse habitats.

2.3 Wildflower meadows full of butterflies and bumblebees – a Biodiversity Action Plan target plant community

Wildflower meadows are rare. Despite the 1995 Biodiversity Action Plan target of no further depletion of this habitat, they have continued to vanish from our landscape. The decline in native bumblebees, which are essential crop pollinators, particularly early in the year when hive bees are inactive, is linked to the decline in flower-rich meadows.

In the days of horse transport, the best land was used as hay meadow and all along the Middle Ouse there were extensive hay meadows and pastures. Wild flowers such as cowslips and oxeye daisies grew in profusion. Now only small pockets of flower-

rich grassland remain and the connected meadow-scape essential for bumblebees has gone. The linear landscape along the Middle Ouse provides a wonderful opportunity for re-connecting the flower-rich fragments through grassland enhancement of suitable sites.

Our research shows that this can be done on sites where the soil fertility is low by planting wildflower plugs and sowing Weald Meadow Initiative wildflower seed. Such enhancement would retain agricultural land in good condition, enabling a return to low-input farming when oil-driven agriculture is no longer possible.

3 Methods

3.1 National Vegetation Classification (NVC) survey of principal grassland habitats bordering the Middle Ouse

The NVC is the most widely used system for describing vegetation and is particularly useful in the context of the present report because it relates to soil properties and site management. We followed the methods described in Rodwell (1992). The starting point is a botanical survey, which records the abundance (determined by a visual estimate of percentage cover using the Domin scale – see Box 1, p. 13 – for a description) of all the species present in a series of sample squares (quadrats) of either 2 x 2 or 4 x 4 metres. From this dataset we assign an NVC community to the present-day grassland based on the frequency (percentage of quadrats in which each species is present) and abundance of each species. Points of difference between our data and the average for this type of grassland are noted. We can then draw conclusions about how this grassland has evolved in the context of past land use and about how it can be transformed in future.

3.2 Determination of historical land-use and flooding

The historical land use of the site was investigated through document analysis and oral history interviews with local farmers.

3.3 Selection of appropriate future management

Survey data were analysed in an historical and cultural context to enable decisions to be made on the most appropriate management with respect to biodiversity and flood alleviation for the site.

4 Site description

4.1 Location

The area of Vuggles Brook covered by this report lies along the west bank of the main Ouse from TQ441193 (just upstream from a former meander) to TQ441190. It is roughly rectangular in shape, but narrows sharply to a long thin point at the southern end (Figure 2). In 1839 it was known as The Seven Acres (Figure 3). A ditch runs the length of the field near the western boundary.

Buckham Hill Brook is a long thin meadow lying along the east bank of the main Ouse from TQ441196 to TQ441190. Most of the meadow is bounded on the eastern side by woodland, but the southern tip is bisected longitudinally by a ditch (Figure 2). In

1839 it was known as Six Acre Brook (Figure 3). The shape of these Brooks is the same today as it was in 1879 (Figure 4).

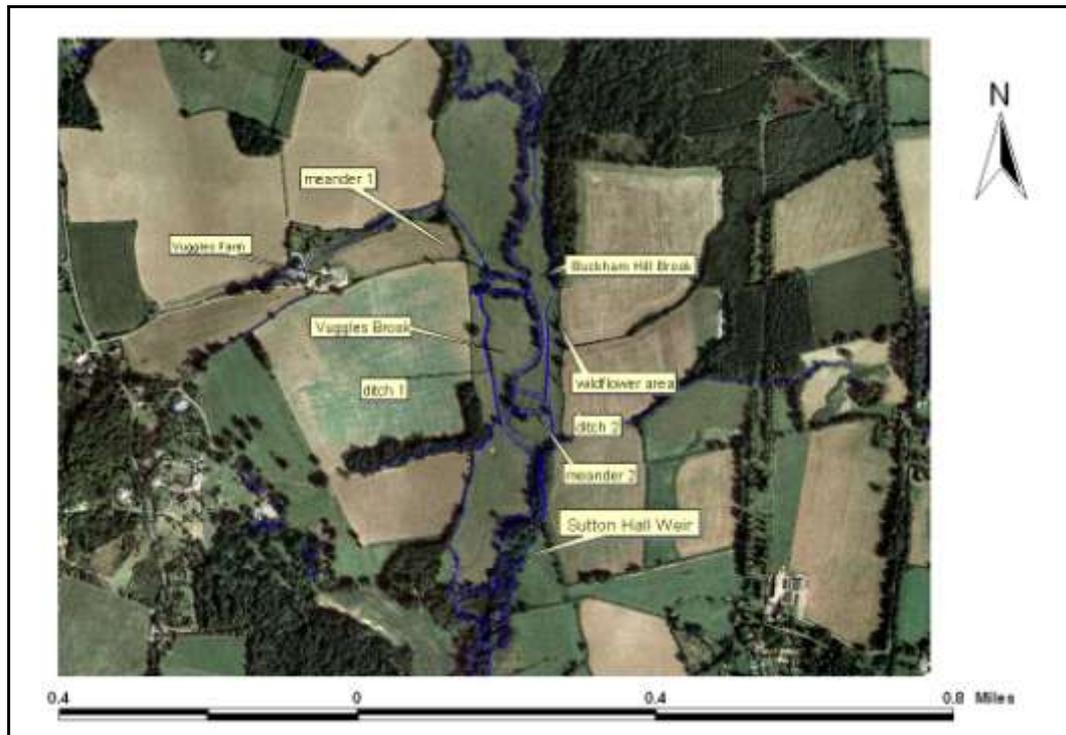


Figure 2 Location of Vuggles and Buckham Hill Brooks.

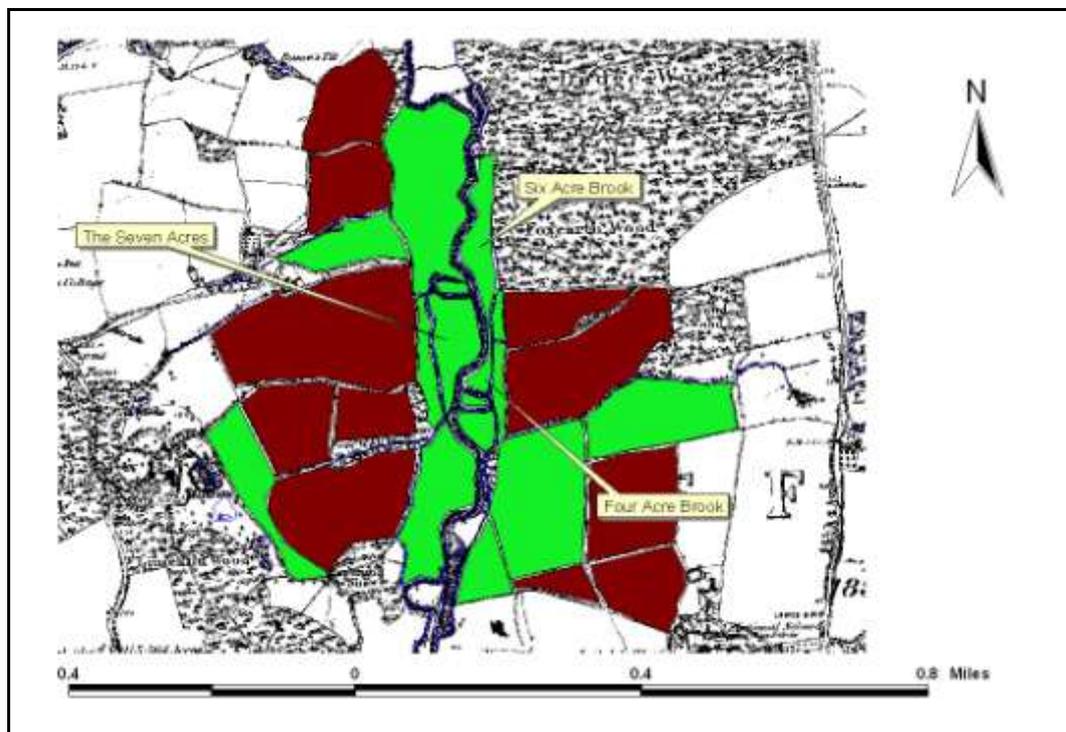


Figure 3 Map showing land use and field names compiled from the 1839-40 Tithe Map and apportionment data by Peter Heeley. The Seven Acres is now known as Vuggles and Six Acre Brook is now known as Buckham Hill Brook. Use as pasture is shown as green and arable as brown. Source: Tithe maps for Barcombe, Isfield and Newick: East Sussex Record Office: ESRO TD/E42, ESRO TD/54 and ESRO TD/134.

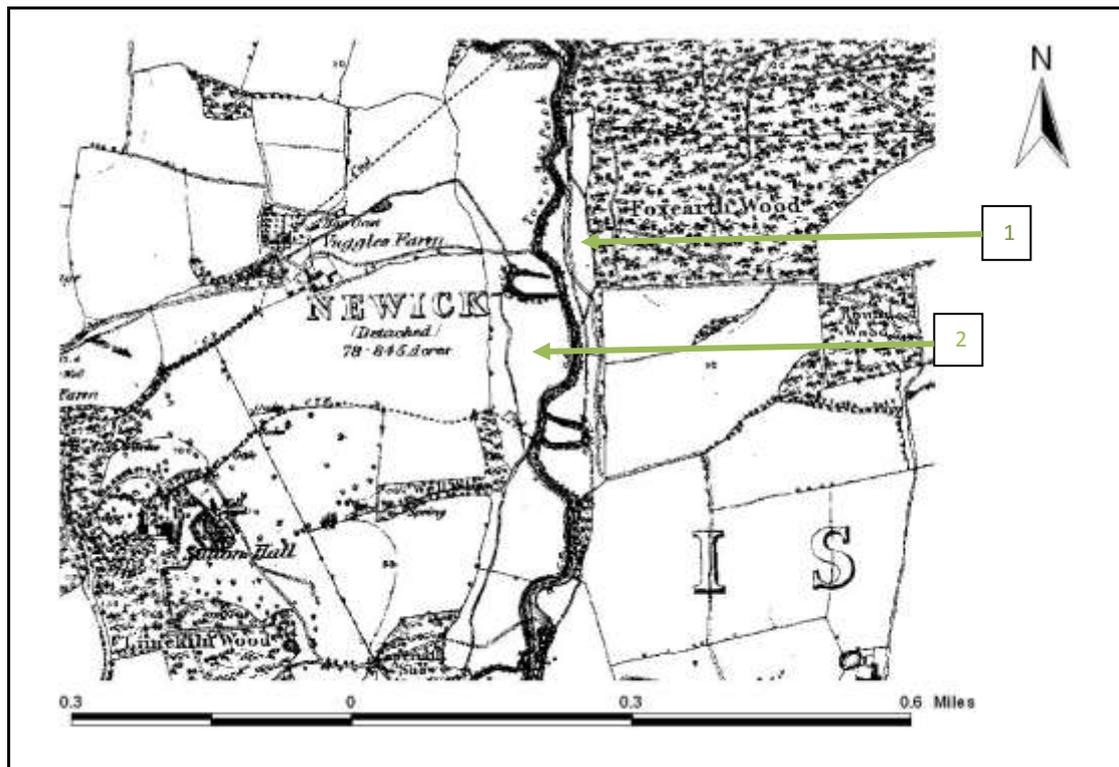


Figure 4 Ordnance Survey 1:10,560 map of 1879. 1 indicates Buckham Hill Brook and 2 Vuggles Brook.

4.2 Soil type

The soil is Alluvium, flanked by sand and silt deposits known as 'Head', and lying more generally within the Upper Tunbridge Wells Sand formation (Figure 5). The soil pH is 7.0 for Vuggles Brook and 6.0 for Buckham Hill Brook. The soil is free-draining as the current farm manager, James Wallis, explained:

'The soil is very free-draining ... it's Tunbridge Wells sand and loam from the river.'

4.3 Meanders and spring-fed wet areas

There is a former meander in Vuggles Brook, which contains wetland vegetation, and another in Four Acre Brook (Figure 3), which was not surveyed. In both Vuggles Brook and Buckham Hill Brook there are extensive ditches. These are fed by local woodland springs (Figure 2) and contain wetland vegetation.

4.4 Flooding

Both Vuggles Brook and Buckham Hill Brook act as washlands, as Paddy Cumberlege, who farmed there from 1970 to 1998, explained:

'During the winter it would flood two or three times And it didn't last that long ... no more than three days.'

James Wallis, the current land manager, who took over in 1998, confirmed that the Brooks still flood.

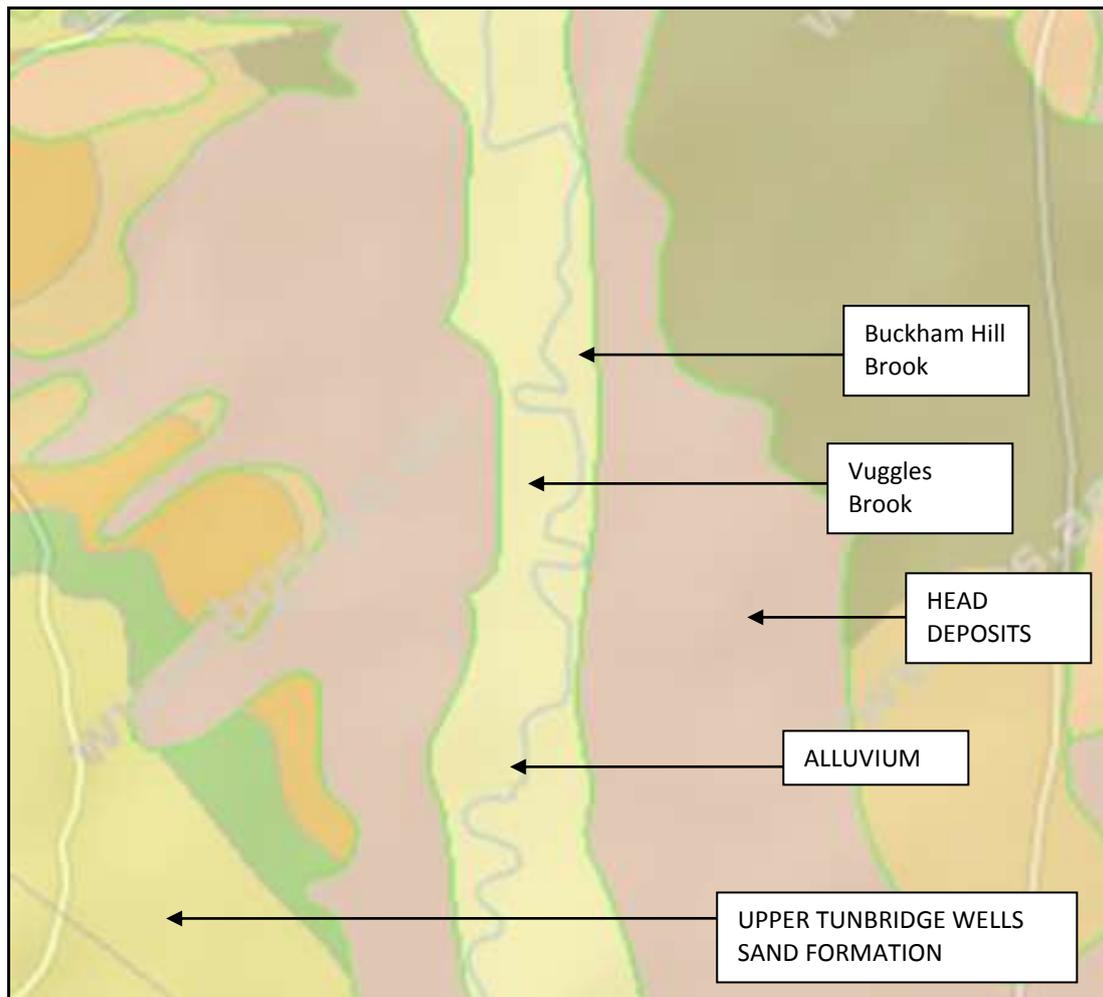


Figure 5 Map showing the geology of the area around Vuggles Brook and Buckham Hill Brooks.
 Source: British Geology Survey, Newick at Geology of Britain
<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

5 Land use

These Brooks are part of an extensive band of permanent grassland lying alongside the river Ouse. At the time of the Tithe survey, they were being managed as pasture (Figure 3) and in 1970 they were still being grazed as part of a low input system of farming.

'We were very low cost and quite low outputs. Profit was about the same [as surrounding higher input farming].'

It is likely that little fertilizer was applied until 1998 when Paddy retired. He talks about putting basic slag on the arable farmland and then in the 1990s ash from chicken dung, which had been burned to produce electricity, but

'... can't remember ever having put it on the Brooks, although probably we did.'

When the current estate manager came in 1998, the Brooks were being managed more intensively with all 550 cows on the estate using the Brooks:

'It wasn't pushed very hard, it wasn't ploughed ... there are quite big areas of grassland that would have been fertilized.'

But fertilizer application ceased in 2000 when the estate became organic, followed in 2004 by a Stewardship agreement:

'We weren't allowed to put fertilizer on and we weren't allowed to start grazing 'til April and we had to remove our livestock by end of October.'

Also, as part of the 2004 agreement, hay was cut in the three areas of Vuggles Brook every 3 years. The hay cut is due again in 2013. No lime has been applied.

6 Botanical survey of grassland

6.1 Survey of Vuggles Brook

6.1.1 Grassland community

The results of this survey are presented in Table 1. The grassland best fitted the Ryegrass–Rough Meadow Grass community (MG7b) in the NVC, but meadow foxtail was constant, not rare. Meadow foxtail is characteristic of Ryegrass–Meadow Foxtail grassland (MG7d), so the grassland may be transitional. Dandelion was also constant rather than infrequent.

Table 1 Results of botanical survey in Vuggles Brook (TQ441193 to TQ441190), 25 May 2011. Five samples (quadrats), each 2 m x 2 m, were surveyed and the summarised results show Frequency and range of Domin Values for each species. See Box 1 (page 11) for explanations.		
English name	Scientific name	Frequency and Domin range
Creeping Bent	<i>Agrostis stolonifera</i>	V (5–8)
Perennial Rye Grass	<i>Lolium perenne</i>	V (5–8)
Cock's-foot	<i>Dactylis glomerata</i>	V (2–6)
Yorkshire Fog	<i>Holcus lanatus</i>	V (4–5)
Creeping Thistle	<i>Cirsium arvense</i>	V (1–4)
Meadow Foxtail	<i>Alopecurus pratensis</i>	IV (4–5)
Rough Meadow Grass	<i>Poa trivialis</i>	IV (4–5)
Dandelion	<i>Taraxacum officinale</i>	IV (1–2)
Creeping Buttercup	<i>Ranunculus repens</i>	III (1–5)
Common Bent	<i>Agrostis capillaris</i>	II (5–6)
Red Fescue	<i>Festuca rubra</i>	II (5–6)
White Clover	<i>Trifolium repens</i>	II (2–4)
Thyme-leaved Speedwell	<i>Veronica serpyllifolia</i>	II (1–2)
Cut-leaved Crane's-bill	<i>Geranium dissectum</i>	I (2)
Greater Plantain	<i>Plantago major</i>	I (1)
Broad-leaved Dock	<i>Rumex obtusifolius</i>	I (1)
Red Clover	<i>Trifolium pratense</i>	I (1)
Yarrow	<i>Achillea millefolium</i>	In field
Bugle	<i>Ajuga reptans</i>	In field
Sweet Vernal-grass	<i>Anthoxanthum odoratum</i>	In field
Spear Thistle	<i>Cirsium vulgare</i>	In field
Cat's-ear	<i>Hypochaeris radicata</i>	In field
Meadow Buttercup	<i>Ranunculus acris</i>	In field

Box 1**Frequency**

I – occurs in 1-20% of samples; II – occurs in 21-40% of samples; III – occurs in 41-60% of samples; IV – occurs in 61-80% of samples; V – occurs in 81-100% of samples.

Domin values: percentage cover being assessed by eye in each sample

10, 91-100%; 9, 76-90%; 8, 51-75%; 7, 34-50%, 6, 26-33%, 5, 11-25%; 4, 4-10%; 3, <4% with many individuals; 2, <4% with several individuals; 1, <4% with few individuals.

6.1.2 Notable species

In addition to the community Constants, Yorkshire fog and creeping thistle were constant. The estate manager attributed the thistle problem to restricted grazing under the terms of the Stewardship agreement (see section 5).

6.1.3 Number of species per quadrat

There was an average of 11 species per quadrat, with a range of 10 to 12. This is more species-rich than the standard table for MG7b – 8 (4-14).

6.1.4 Relationship with other grassland communities

The community Constants, Timothy and Rough Meadow Grass, were frequently included in seed mixtures for moist soils, but there is no evidence that the Brooks were ever ploughed (see section 5) or reseeded. Instead they have been treated as permanent pasture and have been without fertilizer application since 2000. This, coupled with less intensive grazing, means that they are slowly becoming more species-rich.

6.2 Survey of Buckham Hill Brook

6.2.1 Grassland community

The results of this survey are presented in Table 2. The grassland best fitted the Ryegrass–Meadow Foxtail community (MG7d) in the NVC, but rough meadow grass was constant, not infrequent. Rough meadow grass is characteristic of Ryegrass–Rough Meadow Grass grassland (MG7b) and its high frequency in Buckham Hill Brook may indicate a recent transition from this type of grassland. Ryegrass–Meadow Foxtail grassland was commonly treated as hay meadow and in some years this field may have been cut for hay, a practice that we recorded in oral history interviews for other streamside pastures along the Ouse.

6.2.2 Notable species

In addition to the community Constants, the following species were constant: Yorkshire fog; creeping buttercup; and creeping thistle. The estate manager attributed the thistle problem to restricted grazing under the terms of the Stewardship agreement (see section 5).

6.2.3 Number of species per quadrat

There was an average of 11 species per quadrat, with a range of 11 to 13. This is more species-rich than the standard table for MG7d – 9 (3–14).

6.2.4 Relationship with other grassland communities

When treated as permanent pasture without fertilizer application, Ryegrass–Meadow Foxtail grassland can be converted to the more species-rich Ryegrass–Crested Dog’s-tail grassland (MG6).

6.3 Survey of Meander 1, Ditch 1 and Ditch 2

Meander 1 and the two ditches were walked. Species present were listed but no estimates of abundance were recorded. The species list is given in Table 3.

6.3.1 Notable species in Meander 1

There were a number of attractive wetland plants growing in Meander 1: water-plantain, nodding bur-marigold, lady’s-smock, yellow iris, gipsywort, yellow water-lily, water mint, creeping forget-me-not, tufted forget-me-not, celery-leaved buttercup, brooklime and water starwort. Unfortunately the invasive parrot’s-feather was abundant. Meadow buttercup and red clover, which are characteristic of hay meadows, were growing beside the meander.

Table 2 Results of botanical survey in Buckham Hill Brook (TQ441196 to TQ441190), 25 May 2011. Five samples (quadrats), each 4 m x 4 m, were surveyed and the summarised results show Frequency and range of Domin Values for each species. See Box 1 (p. 11) for explanations.

English name	Scientific name	Frequency and Domin value range
Perennial Rye Grass	<i>Lolium perenne</i>	V (4–9)
Meadow Foxtail	<i>Alopecurus pratensis</i>	V (4–8)
Creeping Buttercup	<i>Ranunculus repens</i>	V (4–8)
Rough Meadow Grass	<i>Poa trivialis</i>	V (4–8)
Yorkshire Fog	<i>Holcus lanatus</i>	V (4–6)
Creeping Thistle	<i>Cirsium arvense</i>	V (2–5)
Cut-leaved Crane’s-bill	<i>Geranium dissectum</i>	IV (1–4)
Creeping Bent	<i>Agrostis stolonifera</i>	III (5–9)
Soft Brome	<i>Bromus hordeaceus</i>	III (3–7)
Red Fescue	<i>Festuca rubra</i>	III (4–5)
Broad-leaved Dock	<i>Rumex obtusifolius</i>	III (1–2)
Dandelion	<i>Taraxacum officinale</i>	III (1–2)
Creeping Cinquefoil	<i>Potentilla reptans</i>	II (2)
Common Bent	<i>Agrostis capillaris</i>	I (4)
Cock’s-foot	<i>Dactylis glomerata</i>	I (4)
Hairy Sedge	<i>Carex hirta</i>	I (3)
Ribwort Plantain	<i>Plantago lanceolata</i>	I (1)
Timothy	<i>Phleum pratense</i>	I (1)

6.3.2 Notable species in Ditch 1

There were a number of attractive wetland plants growing in Ditch 1: water-plantain; lady’s-smock, marsh bedstraw, yellow iris, greater bird’s-foot-trefoil, ragged robin, gipsywort, purple-loosestrife, water mint, creeping forget-me-not, celery-leaved buttercup, brooklime and water starwort. Unfortunately the invasive parrot’s-feather was also present. Several plants characteristic of hay meadows were growing beside the ditch: cowslip, meadow buttercup, meadow vetchling and selfheal.

Table 3 Species recorded in Ditches 1 and 2 and Meander 1, 25 May 2011				
English name	Scientific name	Ditch 1	Meander 1	Ditch 2
Bugle	<i>Ajuga reptans</i>	p		p
Water-plantain	<i>Alisma plantago-aquatica</i>	p	p	p
Marsh Foxtail	<i>Alopecurus geniculatus</i>	p	p	
Meadow Foxtail	<i>Alopecurus pratensis</i>	p	p	p
Cow Parsley	<i>Anthriscus sylvestris</i>		p	
Fool's Water-cress	<i>Apium nodiflorum</i>	p	p	p
Winter-cress	<i>Barbarea vulgaris</i>			p
Nodding Bur-marigold	<i>Bidens cernua</i>		p	
Soft Brome	<i>Bromus hordeaceus</i>			p
Water-starwort	<i>Callitriche</i> sp.	p	p	
Hedge Bindweed	<i>Calystegia sepium</i>			p
Lady's-smock	<i>Cardamine pratensis</i>	p	p	p
Hairy Sedge	<i>Carex hirta</i>			p
Greater Tussock-sedge	<i>Carex paniculata</i>	p		
Cyperus Sedge	<i>Carex pseudocyperus</i>			p
Remote Sedge	<i>Carex remota</i>		p	
Common Mouse-ear	<i>Cerastium fontanum</i>	p	p	p
Creeping Thistle	<i>Cirsium arvense</i>		p	
Spear Thistle	<i>Cirsium vulgare</i>	p		p
Cock's-foot	<i>Dactylis glomerata</i>		p	p
Wild Teasel	<i>Dipsacus fullonum</i>	p		
Great Willowherb	<i>Epilobium hirsutum</i>	p		p
Hoary Willowherb	<i>Epilobium parviflorum</i>	p		p
Field Horsetail	<i>Equisetum arvense</i>			p
Meadowsweet	<i>Filipendula ulmaria</i>	p		p
Cleavers	<i>Galium aparine</i>	p		
Marsh Bedstraw	<i>Galium palustre</i>	p		p
Cut-leaved Crane's-bill	<i>Geranium dissectum</i>	p	p	p
Ground-ivy	<i>Glechoma hederacea</i>	p	p	p
Floating Sweet Grass	<i>Glyceria fluitans</i>	p	p	p
Yorkshire Fog	<i>Holcus lanatus</i>		p	p
Perforate St John's-wort	<i>Hypericum perforatum</i>	p		
Cat's-ear	<i>Hypochaeris radicata</i>	p		
Yellow Iris	<i>Iris pseudacorus</i>	p	p	
Sharp-flowered Rush	<i>Juncus acutiflorus</i>	p		p
Soft Rush	<i>Juncus effusus</i>	p	p	p
Hard Rush	<i>Juncus inflexus</i>	p		p
Meadow Vetchling	<i>Lathyrus pratensis</i>	p		p
Common Duckweed	<i>Lemna minor</i>		p	
Ivy-leaved Duckweed	<i>Lemna trisulca</i>	p		
Perennial Rye Grass	<i>Lolium perenne</i>	p	p	p
Greater Bird's-foot-trefoil	<i>Lotus uliginosus</i>	p		p
Ragged Robin	<i>Lychnis flos-cuculi</i>	p		
Gipsywort	<i>Lycopus europaeus</i>	p	p	p
Creeping Jenny	<i>Lysimachia nummularia</i>	p	p	p
Purple-loosestrife	<i>Lythrum salicaria</i>	p		p
Water Mint	<i>Mentha aquatica</i>	p	p	p
Tufted Forget-me-not	<i>Myosotis laxa</i>		p	
Creeping Forget-me-not	<i>Myosotis secunda</i>	p	p	p
Parrot's-feather	<i>Myriophyllum aquaticum</i>	p	p	
Yellow Water-lily	<i>Nuphar lutea</i>		p	
Hemlock Water-dropwort	<i>Oenanthe crocata</i>			p
Reed Canary-grass	<i>Phalaris arundinacea</i>	p	p	p
Timothy	<i>Phleum pratense</i>		p	
Greater Plantain	<i>Plantago major</i>	p	p	
Rough Meadow Grass	<i>Poa trivialis</i>	p	p	p
Water-pepper	<i>Polygonum hydropiper</i>		p	

Table 3 Species recorded in Ditches 1 and 2 and Meander 1, 25 May 2011 (continued)				
English name	Scientific name	Ditch 1	Meander 1	Ditch 2
Silverweed	<i>Potentilla anserina</i>			p
Creeping Cinquefoil	<i>Potentilla reptans</i>			p
Cowslip	<i>Primula veris</i>	p		
Selfheal	<i>Prunella vulgaris</i>	p		
Common Fleabane	<i>Pulicaria dysenterica</i>	p		
Meadow Buttercup	<i>Ranunculus acris</i>	p	p	
Creeping buttercup	<i>Ranunculus repens</i>	p	p	p
Celery-leaved Buttercup	<i>Ranunculus scleratus</i>	p	p	p
Common Sorrel	<i>Rumex acetosa</i>			p
Broad-leaved Dock	<i>Rumex obtusifolius</i>	p	p	p
Water Figwort	<i>Scrophularia auriculata</i>	p		p
Red Campion	<i>Silene dioica</i>			p
Bittersweet	<i>Solanum dulcamara</i>	p		p
Branched Bur-reed	<i>Sparganium erectum</i>			p
Hedge Woundwort	<i>Stachys sylvatica</i>	p		
Bog Stitchwort	<i>Stellaria alsine</i>			p
Lesser Stitchwort	<i>Stellaria graminea</i>	p	p	p
Tansy	<i>Tanacetum vulgare</i>	p		
Dandelion	<i>Taraxacum officinale</i>			p
Lesser Hop-trefoil	<i>Trifolium dubium</i>	p		
Red Clover	<i>Trifolium pratense</i>		p	
White Clover	<i>Trifolium repens</i>	p		
Common Nettle	<i>Urtica dioica</i>	p	p	p
Brooklime	<i>Veronica beccabunga</i>	p	p	p
Bush Vetch	<i>Vicia sepium</i>		p	
Common Vetch	<i>Vicia sativa</i>			p



6.3.3 Notable species in Ditch 2

There were a number of attractive wetland plants growing in Ditch 2: water plantain; lady's-smock, marsh bedstraw, greater bird's-foot-trefoil, gipsywort, purple-loosestrife, water mint, creeping forget-me-not, celery-leaved buttercup, branched bur-reed (Figure 6) and brooklime. Meadow vetchling, which is characteristic of hay meadows, was growing beside the ditch.

Figure 6 Branched bur-reed found in Ditch 2.

7 Conclusions from our research

7.1 General comments

These areas of permanent pasture are made up of rather species-poor grassland but are traversed by species-rich ditches and a former meander, which contain many attractive wetland plants. Buckham Hill Brook is isolated from the rest of the estate by the main Ouse. Cattle have to cross on an insubstantial bridge, which they are

reluctant to tackle. This means that grazing pressure is less here than in Vuggles Brook. This may change when construction of a new concrete bridge is complete.

7.2 Potential for grassland enhancement

The potential for grassland enhancement is good. Soil fertility in Vuggles Brook and Buckham Hill Brook was low ($P = 0$, $N = 0$) when we tested it in 2011, except for potassium, which was high ($K = 4$). The high potassium may be a result of the application of slag, but is not considered to be a problem for grassland enhancement (D. Brickwood, pers. comm.). A small area of Buckham Hill Brook was chosen for grassland enhancement and in 2011 volunteers sowed Weald Meadow Initiative wildflower seed (Figure 7) and planted 2000 wildflower plugs. Green hay from this area will be spread on strips in the rest of the Brooks in subsequent years, so that the species-rich vegetation is 'rolled out' across the site.

7.3 Potential for flood alleviation

These Brooks continue to provide valuable flood alleviation, both as washland and as permanent grassland with worm tunnels and plant roots absorbing rainwater (Stoate 2011).

7.4 Discussion of Royal Haskoning suggestions

The Royal Haskoning report (2009, p. 73) made the following suggestions for Reach 1, which is upstream from Sutton Weir.



Figure 7 Volunteers sowing wildflower seed in Buckham Hill Brook.

7.4.1 'Re-instate cut-off meanders.'

The area we studied is immediately upstream from Reach 1. The two meanders referred to in their report are downstream from the meander we looked at, but reinstating the upstream meander would bring the same benefits of increased floodplain inundation frequency and improved morphological diversity. However, the parrot's-feather, which is present in the meander, would have to be eliminated first. It is not known whether or not there is also parrot's-feather in the meanders that the Royal Haskoning report proposes to reconnect.

7.4.2 'Re-profile banks' – reducing embankment levels to improve floodplain connectivity.

This is potentially a good idea, but when bare ground is created great care needs to be taken to prevent the establishment of dock and creeping thistle. In the past, when the ditches were cleared out the spoil was sown with grass seed, as James Wallis explained:

'If you don't treat your spoil and put grass seed on them, they become weed strips alongside your ditches.'

We would recommend sowing with a wildflower seed mix, which would include indigenous grasses and attractive hay-meadow flowers to encourage butterflies and bumblebees.

7.4.3 'Creation of buffer strip' – fencing to prevent livestock trampling and increase the potential for marginal vegetation and buffering of sediment input from surface run-off.

Fencing to prevent livestock trampling does not work well in washlands because of the debris that comes with the floodwater and is left behind caught on the fence. There is no evidence that livestock trampling in the meander and ditches has done any harm to the wetland vegetation here but they do tread down the banks. There is evidence that riverside trampling creates the right habitat for many species of dragonflies (see Natural England, undated).

7.4.4 Other considerations

Royal Haskoning also suggest that reconnecting the meanders will create wetland because of the increased floodplain inundation frequency, but the free-draining soil present throughout these Brooks will not support wetland vegetation. On the other hand, the spring-fed ditches already contain attractive wetland vegetation, which the current land manager is keen to protect. Ditches do have to be cleared from time to time and the plan is to clear banks in the following order: year 1, one bank of Ditch 1; year 2, one bank of Ditch 2; year 3, the other bank of Ditch 1; year 4, the other bank of Ditch 2. Spoil would be left to dry out, then levelled with a tractor and sown with grass seed. Rather than sowing with grass seed, this would be an opportunity to use wildflower seed and to get more species into the brooks.

8 References

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Oral history interviews

Zaniewicka, C. (2011) Interview with Paddy Cumberledge, retired farm manager, recorded on 11 July 2011 and interview with James Wallis, farm manager, recorded on 16 November 2011.

Recordings of the interviews can be accessed via contact details on page 2.