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A487 New Dyfi Bridge

Environmental Statement - Volume 3: Appendix 9.2

National Vegetation Classification Survey Report

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Ove Arup and Partners

A487 New Dyfi Bridge, Machynlleth

Vegetation survey

September 2015

Sturgess Ecology

Contents

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Cover photographs: Left: Looking east towards Dyfi footbridge with MG6 grassland and MG10 Rush pasture in foreground; Right: Dyfi river, looking west from footbridge, with W10 woodland on far bank.

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1. Introduction

Ove Arup and Partners have commissioned Sturgess Ecology to undertake a vegetation survey of land at the proposed A487 New Dyfi Bridge, Machynlleth. The work is required as part of a range of ecological surveys which are being undertaken as part of the production of an Environmental Statement for the project.

This report presents an outline of the survey methodology and summarises the findings through a series of vegetation descriptions and target notes. It then provides a preliminary assessment of the nature conservation value of the vegetation types surveyed.

The study area was generally defined by a 100m buffer around the proposed new route. This was modified very locally to exclude some small areas which could not be accessed and which would remain unaffected by construction works. An overview of the study area is shown on an aerial photograph background in Figure 1.

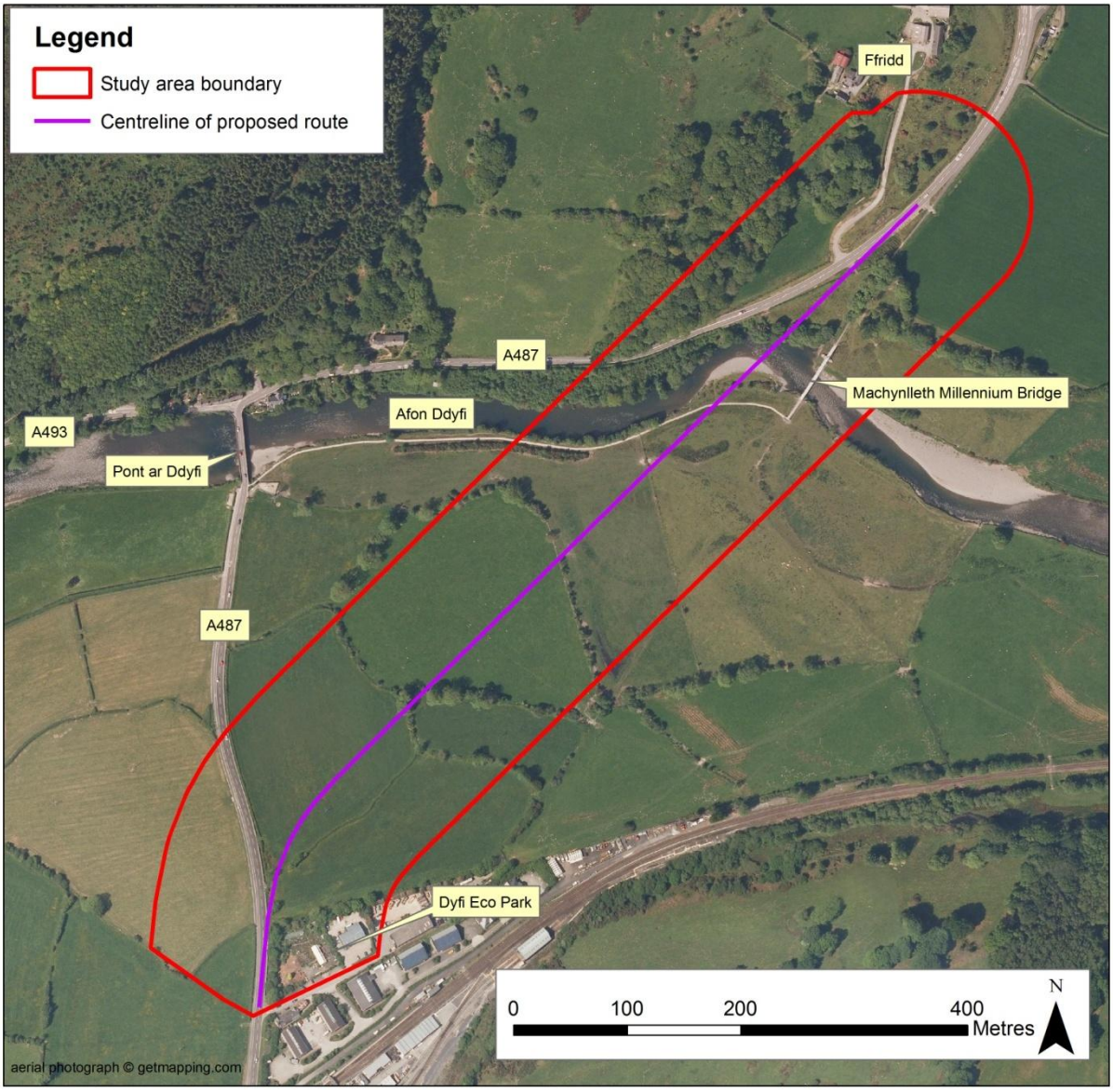

Figure 1. Overview of study area

2. Survey method

The objective of the study was to map and describe the plant communities within the site using National Vegetation Classification (NVC) methods.

The fieldwork and assessment were undertaken by Dr Peter Sturgess CEnv MCIEEM. He is an experienced botanist and familiar with the NVC.

The survey work was carried out on 18 and 19 August 2015. The weather during this time was mostly dry, but there was intermittent light rain on 19 August.

The survey was mainly undertaken using a simple walk-through method, walking the site to examine and map the various vegetation types. The plant communities were plotted by eye onto an aerial photograph base plan. Photographs were also taken to illustrate the main vegetation types.

The vegetation was delineated into approximately homogeneous stands for mapping purposes. These mostly coincide with the broad habitats and therefore the mapping has attempted to use similar map colouring to standard JNCC habitat survey methodology (JNCC, 2011). The plant communities were described in terms of the published NVC communities (Rodwell, 1991, etc.) through the use of quadrat sampling and target notes.

A total of 51 quadrats were recorded. The quadrat surveys were generally limited to the grassland habitats and involved recording every species within square 2x2m sample areas. These quadrat areas were selected as being representative samples of the stand in which they occurred. The vegetation of features such as scrub, water bodies and woodlands were described as target notes. This involved a habitat description supplemented by listing the main plant species in these less uniform areas.

The cover of every species within each quadrat was assessed using the Domin scale, as shown in Table 1. An estimate was also made of the percentage cover by vegetation and the approximate vegetation height (as an average through the quadrat).

Table 1. Domin scale for recording vegetation cover

Percentage cover	Domin score
91-100%	10
76-90%	9
51-75%	8
34-50%	7
26-33%	6
11-25%	5
4-10%	4
<4% - many individuals	3
<4% - several individuals	2
<4% - few individuals	1
Associate species (within 1m of a quadrat)	A

The quadrats recorded from each similar plant community were grouped together into floristic tables, giving each distinct community its own table. Following NVC methodology, the occurrence of each species within the group of quadrats was assigned a constancy score as indicated in Table 2. The species within each table were then listed in order of their constancy score. Once the tables were completed, they were compared with the communities within the published NVC classification.

Table 2. Constancy scores for quadrat data

Frequency within quadrats	Constancy Score
81 - 100%	V
61 - 80%	IV
41 - 60%	III
21 - 40%	II
1 - 20%	I
Associate species (A) only	

The timing of the survey in late-August may have meant that some species could have been overlooked, and either missed completely or may be under-represented in the findings. This would mainly be expected to apply to early-flowering species in the woodlands and hedges, and species that would have been removed when the semi-improved grasslands were cut. Limited access may also have affected the results; in some cases where the surveyor was limited to making observations from the edge of a field the margin may not be fully representative of the whole field. However, this mainly applies to relatively species-poor pasture which is unlikely to be of significance for its flora.

3. Survey findings

A list of the plant species recorded during the survey is presented in Appendix 1, which includes the scientific and common names for each species.

The NVC mapping is presented as Appendix 2. These broadly show the main blocks of different vegetation types, overlaid on an aerial photograph to provide a context for the observations. The vegetation stands have been plotted by eye and do not always have clearly defined boundaries (for example where grassland with scattered Bracken merges into continuous Bracken). In some cases the stands of vegetation comprise a mix of two or more distinct communities, or include small patches of another community that is too small to map (for example, the grazed fields predominantly support semi-improved grassland, but often also have more trampled patches with open vegetation communities). The target note descriptions provide further detail on the composition and mix of plant communities within the various parts of the site.

The locations of the quadrats are shown on the survey maps. The quadrats were sampled from communities dispersed widely across the site to help provide an indication of the range of variation within each community and across the different parts of the site.

The vegetation descriptions and constancy tables are presented below. They attempt to describe the vegetation in terms of the published NVC communities. Several vegetation types can be readily assigned to the published communities, but some transitional ones are difficult to categorise precisely and some have affinities with more than one of the published communities. The community descriptions are presented together with the quadrat data collected, arranged as NVC vegetation tables. The species in the tables of quadrat data are arranged in order of frequency, as denoted by the constancy score in the right-hand column.

MG1 Arrhenatherum elatius grassland

MG1 grassland within the study area is limited to a few small fragments where grassland is relatively free from grazing. The largest of these is a very thin strip (too narrow for a standard quadrat) beside the A487, which is represented by TN3. The flora is of relatively low diversity and limited to common species, the most frequent being Yorkshire Fog, Nettle and False Oat-grass. The following plants were recorded in the strip at TN3:

Achillea millefolium
Arrhenatherum elatius
Carex muricata ssp. pairae
Elytrigia repens
Epilobium hirsutum
Equisetum arvense
Festuca rubra
Galium aparine
Heracleum sphondylium
Holcus lanatus
Lathyrus pratensis
Potentilla anserina
Rosa canina
Rumex conglomeratus
Sonchus oleraceus
Trifolium repens
Urtica dioica
Vicia sepium

Narrow strip of MG1 grassland beside A487.

MG5 Centaurea nigra - Cynosurus cristatus grassland in road verges

The road verges at the north-east of the study area are managed by mowing, and they support a moderately diverse MG5 sward, with a high proportion of fine leaved grasses and flowering herbs including Common Bird's-foot Trefoil and Red Clover. Quadrats 32, 36 and 41 were recorded from very short regularly mown verges, while 37 and 45 appear to be cut less frequently and support a higher proportion of taller herbs including Common Knapweed.

The MG5 grassland in the narrow verge immediately beside the new cycle lane by TN20 contains several additional species which may be present through the use of wildflower seed or planting. These include Ox-eye Daisy, Meadow Vetchling, Valerian, Lady's Bedstraw, Salad Burnet and Orpine. Several young Apple and Sessile Oak trees have also been planted in this part of the verge.

Mown verge with MG5 grassland at Q36.

Table 3. MG5 quadrat data

Quadrat	32	36	37	41	45	Frequency
Agrostis capillaris	9	5	6	2	7	V
Anthoxanthum odoratum	4	5	5	6	7	V
Festuca rubra	2	2	3	4	4	V
Lotus corniculatus	2	5	2	2	4	V
Plantago lanceolata	2	4	4	2	4	V
Trifolium pratense	4	6	2	4	6	V
Holcus lanatus		7	6	7	5	IV
Juncus effusus		1	2	2	2	IV
Rhytidiadelphus squarrosus	8	2		2	2	IV
Trifolium repens	5	4	A	2	1	IV
Cynosurus cristatus			2	2	4	III
Lolium perenne		2	2	2	A	III
Potentilla reptans	1	1	1			III
Prunella vulgaris	4	4	2			III
Centaurea nigra			2		4	II
Cirsium palustre	1	A	1			II
Galium palustre			1	1		II
Hypochaeris radicata		2		A	2	II
Luzula campestris	2			2		II
Ranunculus repens	2	2				II
Senecio jacobaea		2	1			II
Taraxacum sp.	2	1				II
Achillea millefolium			1	A		I
Arrhenatherum elatius			1	A	A	I
Bromus hordeaceus			1			I
Calliergonella cuspidata				2		I
Dactylis glomerata		2			A	I
Juncus tenuis		1				I
Leucanthemum vulgare		1				I
Plantago major	2	A				I
Potentilla anserina			6	A		I
Ranunculus acris		1				I
Rumex acetosella				1		I
Trifolium dubium	2					I
Brachypodium sylvaticum		A				
Eupatorium cannabinum			A			
Juncus acutiflorus			A			
Potentilla x mixta			A			
Rumex obtusifolius					A	
Total species	16	21	20	16	13	
Average vegetation height (cm)	10	10	40	15	35	
Vegetation cover (%)	100	100	100	100	100	

MG6 Lolium perenne - Cynosurus cristatus grassland

The majority of the grazed pasture in the south and west of the study area is MG6 grassland. It has a low species diversity and is dominated by Yorkshire Fog and Perennial Rye-grass. The fields are damp and some have patches of Soft Rush scattered through them. Where the rushes are denser they sometimes show a transition to MG10 rush pasture. There are also localised transitions towards MG5 grassland at some of the drier field margins.

MG6 grassland with scattered rushes and localised cattle-poached muddy areas

Table 4. MG6 quadrat data

Quadrat	2	3	6	7	8	9	14	15	16	18	22	23	29	Freq.
Holcus lanatus	2	4	9	5	8	9	5	8	6	5	6	5	2	V
Ranunculus repens	6	2	4	2	4	4	2	2	5	2	1		5	V
Agrostis capillaris	9	9			7	2	4	6	6	5	6			IV
Lolium perenne		4	4		5	2	7	4	8		8	8	5	IV
Juncus effusus							3	7	2	4	2		5	III
Ranunculus acris	A	1				1	2	2		2	1	1		III
Rumex acetosa	2	2		2	4	4			1				3	III
Trifolium repens	2						2	1	A		2	2	6	III
Agrostis stolonifera				3					A	2			4	II
Alopecurus pratensis		1	4	6							1		2	II
Anthoxanthum odoratum	4	4			A		2	2			4			II
Cardamine pratensis										2	1	1	3	II
Cynosurus cristatus							4	2			2	2		II
Dactylis glomerata	2	2		4	A		2							II
Rumex obtusifolius			1	A	1	1		1	A		A		2	II
Taraxacum sp.							1					1	1	II
Cerastium fontanum					1						1			I
Cirsium arvense				A								2		I
Festuca rubra	4				4									I
Galium palustre								2						I
Heracleum sphondylium		A		1										I
Hypochaeris radicata	3					1								I
Plantago lanceolata					A		2				2			I
Poa trivialis				4	4	A								I
Potentilla anserina													4	I
Rhytidiadelphus squarrosus								2						I
Urtica dioica						A							2	I
Total species	9	9	5	8	9	8	12	12	6	7	13	8	13	
Average veg. height (cm)	25	25	40	25	20	30	30	15	25	20	25	25	35	
Vegetation cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	

Transitional MG6 grasslands

A small field north of the Millennium Bridge represented by Quadrats 33, 34 and 35 supports a sward dominated by fine-leaved grasses and with a relatively high proportion of flowering herbs, but is relatively damp and has patchy Soft Rush scattered through much of it. The field is partly shaded by tall trees from the adjacent wooded riverbank. The grassland had been cut earlier in the summer and was difficult to place within an NVC category. However, it appears to be a rather damp example of MG6b *Lolium perenne - Cynosurus cristatus* grassland *Anthoxanthum odoratum* sub-community, with local elements in transition to MG10 rush pasture. The apparent absence of Crested Dog's-tail is unexpected, because this is usually constant in MG6-related swards.

Damp grassland resembling MG6b north of the Millennium Bridge

Table 5. Quadrat data for damp field north of cycle bridge

Quadrat	33	34	35	Frequency
Agrostis capillaris	8	7	6	V
Anthoxanthum odoratum	5	7	4	V
Juncus effusus	1	2	4	V
Lotus pedunculatus	4	1	4	V
Cerastium fontanum	1	A	1	IV
Cirsium palustre	1		1	IV
Festuca rubra	4		1	IV
Lolium perenne	A	6	5	IV
Plantago lanceolata	A	1	2	IV
Ranunculus repens	4		2	IV
Rubus fruticosus		1	1	IV
Rumex obtusifolius	2		1	IV
Dactylis glomerata			1	II
Filipendula ulmaria		2		II
Holcus lanatus	4			II
Holcus mollis			4	II
Potentilla reptans		1		II
Ranunculus acris			2	II
Senecio jacobaea		1		II
Arrhenatherum elatius			A	
Centaurea nigra	A			
Lathyrus pratensis	A			
Potentilla anserina		A		
Total species	9	10	15	0
Average vegetation height (cm)	30	30	30	
Vegetation cover (%)	100	100	100	

The strip of ungrazed grassland on the riverbank to the north-east of the Millennium Bridge, represented by Quadrats 26 and 27, supports a rather patchy sward with occasional Gorse

scrub and ant-hills. It is dominated by Common Bent and Yorkshire Fog and appears close to MG6, but it has a different character to the grazed MG6 pasture described previously, being much taller and with a high proportion of flowering herbs. Species found in this community that were not recorded in the quadrats included Grey Willow, Whorled Mint and Giant Fescue. In the absence of grazing it appears to be in transition to MG1 grassland or possibly W23 *Ulex europaeus* - *Rubus fruticosus* scrub and/ or W24 *Rubus fruticosus* - *Holcus lanatus* underscrub.

Ungrazed MG6 with scrub on riverbank near Millennium Bridge.

Table 6. Quadrat data for MG6 riverbank grassland near Millennium Bridge

Quadrat	26	27	Frequency
Agrostis capillaris	4	2	V
Agrostis stolonifera	7	2	V
Galium aparine	1	2	V
Holcus lanatus	5	9	V
Impatiens glandulifera	1	1	V
Potentilla anserina	5	4	V
Achillea millefolium	1	A	III
Anthoxanthum odoratum	2		III
Anthriscus sylvestris		1	III
Centaurea nigra	A	2	III
Dactylis glomerata		2	III
Deschampsia cespitosa	1		III
Festuca rubra	6		III
Galeopsis tetrahit	1	A	III
Galium palustre	2		III
Heracleum sphondylium	1		III
Lolium perenne	2	A	III
Lotus corniculatus	1		III
Oenanthe crocata	1		III
Persicaria hydropiper	4	A	III
Persicaria maculosa		1	III
Phalaris arundinacea	2		III
Plantago lanceolata	4		III
Ranunculus repens		4	III
Rubus fruticosus	A	2	III
Rumex acetosella	2		III
Rumex obtusifolius		1	III
Taraxacum sp.	1		III
Cirsium arvense		A	
Ulex europaeus	A		
Total species	21	13	
Average vegetation height (cm)	35	30	
Vegetation cover (%)	100	100	

MG7 Lolium perenne ley

The more intensively managed fields in the south and west of the study area are classified as MG7 grassland. They support only a low diversity of very common plants, dominated by Perennial Rye-grass and Yorkshire Fog, and their flora is generally of low nature conservation value.

The distinction between MG6 and MG7 can be difficult to make because the communities exist along a continuum. Several of these low-diversity fields with abundant Yorkshire Fog could also be classified as low diversity MG6. However, in this case they have been grouped with MG7 due to the abundant Rye-grass and apparent absence of Crested Dog's-tail. Several of these fields were imminently due to be cut for a silage crop at the time of the survey, so access was limited to the field margins. This may have resulted in the quadrats including a slightly higher diversity than would be found in the middle of the field.

Species-poor MG7 grassland

Table 7. MG7 quadrat data

Quadrat	4	5	11	12	28	31	42	43	44	
Holcus lanatus	4	9	9	9	2	7		2	9	V
Lolium perenne	8	7	8	6	9	7	9	9	8	V
Agrostis capillaris	4	6	4			6		6	7	IV
Ranunculus repens			4	1	4	2	3	2	2	IV
Cerastium fontanum	A		1			A		1	1	III
Trifolium repens					5		5	4	1	III
Alopecurus pratensis	1	4								II
Cirsium arvense		1	1							II
Juncus effusus	A				2		2			II
Ranunculus acris	A				1		1			II
Rumex acetosa	2							1		II
Rumex obtusifolius					2		2		A	II
Agrostis stolonifera					2					I
Anthoxanthum odoratum						5				I
Cardamine pratensis					2					I
Cirsium palustre						2	A			I
Dactylis glomerata	3							A		I
Trifolium pratense						4				I
Urtica dioica	A	A		1						I
Hypochaeris radicata	A									
Potentilla erecta						A				
Rhytidiadelphus squarrosus								A		
Total species	6	5	6	4	9	7	6	7	6	
Average vegetation height (cm)	30	10	10	10	30	15	10	15	20	
Vegetation cover (%)	100	100	100	100	100	100	95	100	100	

MG10 Holcus lanatus - Juncus effusus rush pasture

The MG10 rush pasture community generally occurs as patches within the grazed MG6 pasture. It is characterised by dense Soft Rush, with the most frequent associates being Creeping Bent and Yorkshire Fog. The plant community includes a moderate diversity of common wetland plant species.

A few patches supported shallow standing water at the time of the survey. These supported Floating Sweet-grass and where this was densest the vegetation was closest to the NVC community S22 *Glyceria fluitans* water margin vegetation. These pools are likely to dry out periodically and the presence of water in August may reflect the unusually wet summer. Two of the wetter patches (near Quadrats 17 and 19) contained small amounts of the non-native invasive plant New Zealand Pygmyweed (also called Australian Swamp Stonecrop).

Cattle-trampling has created localised patches of bare mud around several MG10 patches, resulting in local transitions to open vegetation, resembling the OV28 *Agrostis stolonifera - Ranunculus repens* community.

Table 8. MG10 quadrat data

Quadrat	1	17	19	20	21	24	25	Frequency
Agrostis stolonifera	5	7	4	4	4	4	8	V
Juncus effusus	8	8	9	9	9	8	2	V
Holcus lanatus	7	1	4	2	4		2	V
Persicaria hydropiper	2	5	1	2		6	4	V
Glyceria fluitans	2	4	2	4	8			IV
Ranunculus repens		2	A	1	2		4	III
Alopecurus geniculatus		2		2			2	III
Lysimachia nummularia	2		2	A		4		III
Lythrum portula		4	1	5				III
Lolium perenne				A	1		5	III
Potentilla anserina						1	1	II
Ranunculus flammula			1	2				II
Agrostis capillaris				A	2			I
Alopecurus pratensis	4							I
Angelica sylvestris	1							I
Brachythecium rivulare			2					I
Callitriche sp.			2					I
Cardamine pratensis				2				I
Crassula helmsii			4					I
Filipendula ulmaria	4							I
Galium palustre			2					I
Heracleum sphondylium	1							I
Juncus bufonius			2					I
Lotus pedunculatus	7							I
Myosotis laxa							2	I
Rumex obtusifolius					1			I
Salix cinerea		1						I
Solanum dulcamara	2					A		I
Stellaria alsine	2							I
Crataegus monogyna						A		
Impatiens glandulifera	A							
Juncus acutiflorus	A							
Phleum pratense			A					
Rosa canina						A		
Rubus fruticosus						A		
Scrophularia auriculata						A		
Trifolium repens				A				
Total species	13	9	13	10	8	5	9	
Average vegetation height (cm)	100	60	60	90	20	30	30	
Vegetation cover (%)	100	100	100	100	100	90	100	

Patch of MG10 rush pasture

U4 Festuca ovina - Agrostis capillaris - Galium saxatile grassland

The grassy slope between the A487 and Ffridd farm in the north of the study area supports U4 semi-improved acid grassland which forms a mosaic with trees and scattered scrub, rocky outcrops, patchy Bracken and marshy areas. Much of the grass and Bracken had been cut a few days prior to the survey so the mapping and quadrat data should only be regarded as approximate in this case.

The grassland is dominated by Common Bent and supports a moderately diverse mix of associated grasses and herbs. The slope is quite damp and there are several distinctly wet, flushy areas with Sharp-flowered Rush, Soft Rush, Marsh Thistle and sedges including Oval and Slender Sedge. Quadrat 50 was recorded in one of the wetter areas. Bracken is locally very abundant and grades into the NVC U20 community. Additional species not recorded in the quadrats that were seen in the scrubbier parts of the U4 community include Hawthorn, Blackthorn, Rowan, Honeysuckle, Western Gorse and Yellow Pimpernel.

Mosaic of U4 grassland and Bracken near Ffridd farm

Table 9. U4 quadrat data

Quadrat	30	40	46	49	50	51	Frequency
Agrostis capillaris	7	8	2	8	2	8	V
Anthoxanthum odoratum	7	7	9	8	5	8	V
Cirsium palustre	1	1	1	1	1	1	V
Festuca rubra	4		4	6	5	5	V
Luzula campestris	5	2	2	5	4	4	V
Potentilla erecta	2	A	3	2	4	3	V
Rhytidiadelphus squarrosus	2	5	2	5	2	4	V
Trifolium repens	4	6		4	4	6	V
Holcus lanatus			2	2	5	4	IV
Lotus corniculatus	A	2	A	3	4	1	IV
Cerastium fontanum	1	1	1				III
Juncus effusus	A	4	2		2	A	III
Polytrichastrum formosum		2		4		4	III
Pteridium aquilinum	A	2	2	4		A	III
Prunella vulgaris	A	1	1				II
Pseudoscleropodium purum	2					2	II
Rumex acetosella	4	2					II
Calliergonella cuspidata					4		I
Carex cf caryophyllea						1	I
Carex muricata ssp. pairae		1					I
Cynosurus cristatus					2		I
Deschampsia flexuosa				2			I
Glechoma hederacea	2						I
Holcus mollis	2						I
Juncus acutiflorus					6		I
Juncus articulatus					2		I
Lolium perenne					2		I
Plantago lanceolata					2		I
Quercus petraea (s)	1			A			I
Rubus fruticosus			A	1			I
Taraxacum sp.					3		I
Ulex europaeus				A		4	I
Viola riviniana			A	1			I
Arrhenatherum elatius						A	
Crepis capillaris						A	
Dactylis glomerata	A						
Digitalis purpurea						A	
Poa pratensis	A						
Total species	14	14	12	15	18	14	
Average vegetation height (cm)	15	20	20	15	20	15	
Vegetation cover (%)	100	100	100	100	100	100	

Transitional U4 / U1 grassland on rock outcrops and shallow soil

Several rock outcrops within the grassy slope at Ffridd farm support a more open sward which is closest to U4 *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, but on the most rocky parts this is replaced by U1 *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland. Most of these fragments of vegetation were mostly too small and patchy for quadrat recording, although two quadrats were recorded on a recently disturbed rocky slope beside the driveway to Ffridd.

Small amounts of Gorse occur at some rock outcrops. The largest patch is on the ungrazed roadside outcrop east of Quadrat 40. The scrub-covered part of the rock conforms to the NVC community W23 *Ulex europaeus - Rubus fruticosus* scrub.

Fragmentary U4 / U1 grassland on rocky ground adjacent to Ffridd driveway

Table 10. U4/U1 quadrat data from rocky ground adjacent to Ffridd driveway

Quadrat	38	39	Frequency
Agrostis capillaris	4	5	V
Anthoxanthum odoratum	4	3	V
Campylopus introflexus	4	2	V
Festuca rubra	2	2	V
Hypochaeris radicata	4	3	V
Lotus corniculatus	2	2	V
Peltigera sp.	2	1	V
Pogonatum urnigerum	4	2	V
Polytrichastrum formosum	4	5	V
Pseudoscleropodium purum	2	2	V
Salix cinerea	2	1	V
Ulex europaeus	2	2	V
Betula pubescens	1		III
Calluna vulgaris	1		III
Cladonia sp.	2	A	III
Luzula campestris		2	III
Polytrichum piliferum	2		III
Potentilla erecta		2	III
Prunella vulgaris	4		III
Quercus petraea (s)		1	III
Rhytidiadelphus squarrosus		2	III
Blechnum spicant	A		
Rhododendron ponticum	A		
Senecio jacobaea	A		
Arrhenatherum elatius		A	
Plantago lanceolata		A	
Total species	17	16	
Average vegetation height (cm)	10	5	
Vegetation cover (%)	50	40	

The following additional species that were not recorded in the quadrats were also found in association with rock outcrops near Ffridd:

Buddleia davidii
Ceratodon purpureus
Chamerion angustifolium
Cirsium palustre
Dicranum scoparium
Digitalis purpurea
Dryopteris dilatata
Dryopteris filix-mas
Epilobium brunnescens
Eupatorium cannabinum

Festuca ovina
Galium aparine
Galium saxatile
Hedera helix
Hypericum androsaemum
Hypnum lacunosum
Isothecium myosuroides
Juncus effusus
Leontodon autumnalis
Lysimachia nemorum
Polytrichum juniperinum
Potentilla anglica
Pteridium aquilinum
Ptychomitrium polyphyllum
Racomitrium lanuginosum
Rosa arvensis
Rosa canina
Rubus fruticosus
Rumex acetosa
Rumex acetosella
Sedum anglicum
Sorbus aucuparia
Stellaria graminea
Taraxacum sp.
Teucrium scorodonia
Thuidium tamariscinum
Trifolium repens
Ulex gallii
Viola riviniana

Rock outcrop with fragmentary U4/ U1 grassland and W23 Gorse scrub near Ffridd.

Rock outcrop with fragmentary U4/ U1 grassland and Bracken near Ffridd.

U20 Pteridium aquilinum - Galium saxatile community.

The Bracken-dominated vegetation within the study area was limited to the slopes near Ffridd. Some parts of the Bracken stand had been cut down prior to the survey. The Bracken appears to be spreading into the acid grassland habitat and much of it still has a grassy flora beneath the Bracken canopy. The ground flora is dominated by Common Bent and Sweet Vernal-grass, so it is closest to the NVC U20a *Anthoxanthum odoratum* sub-community.

U20 Bracken community (some recently cut) near Ffridd.

Table 11. U20 quadrat data

Quadrat	47	48	Frequency
Agrostis capillaris	2	4	V
Anthoxanthum odoratum	2	4	V
Lotus corniculatus	2	2	V
Potentilla erecta	2	2	V
Pteridium aquilinum	10	10	V
Veronica serpyllifolia	2	1	V
Viola riviniana	2	2	V
Cirsium palustre	A	1	III
Digitalis purpurea	A	1	III
Festuca rubra		2	III
Fragaria vesca	1		III
Juncus effusus	1		III
Luzula campestris	1		III
Pseudoscleropodium purum	2		III
Ranunculus repens		1	III
Rhytidiadelphus squarrosus	2		III
Rumex acetosella	1		III
Taraxacum sp.	1		III
Total species	14	11	
Average vegetation height (cm)	150	140	
Vegetation cover (%)	100	100	

OV21 Poa annua - Plantago major and OV28 Agrostis stolonifera - Ranunculus repens communities

Several areas of heavily cattle-poached ground are present in the grazed pasture in the south of the study area, mainly in gateways and along tracks. These are mostly limited to small muddy patches and they only support common species of plants. The muddy areas do not support very well developed plant communities, but the wetter areas appear closest to OV28, while drier areas are closer to OV21. Only two quadrats from muddy patches were recorded. Quadrat 10 is closest to OV21 community and Quadrat 13 is representative of the relatively damp OV28 community. However, their disturbed nature makes them difficult to assign to NVC categories very precisely and several intermediate and fragmentary forms of these communities, also intergrading with fragmentary MG13 *Agrostis stolonifera - Alopecurus geniculatus* grassland.

Table 12. Quadrat data for OV21 and OV28

Quadrat	10	13	Frequency
Holcus lanatus	2	2	V
Lolium perenne	5	2	V
Rumex obtusifolius	1	2	V
Agrostis stolonifera	2	6	V
Juncus effusus		4	III
Ranunculus repens		4	III
Persicaria hydropiper		3	III
Poa trivialis	2		III
Poa annua	4		III
Stellaria alsine		2	III
Plantago major	5		III
Alopecurus geniculatus		2	III
Cardamine flexuosa		1	III
Lythrum portula		1	III
Matricaria discoidea	4		III
Polygonum aviculare	7		III
Prunella vulgaris		A	
Urtica dioica		A	
Cirsium arvense	A		
Gnaphalium uliginosum	A		
Total species	9	11	
Average vegetation height (cm)	10	10	
Vegetation cover (%)	80	60	

Shingle banks beside river

Several banks of silt and shingle are present in and beside the river, and in a few places these support sparse vegetation. The most frequent species include Creeping Bent, Indian Balsam, Jointed Rush, Water Pepper, Lesser Spearwort and, locally, Reed Canary Grass. The plants were widely spaced and did not appear to form a distinct community, although there are some elements indicative of the OV28 and OV29 communities.

The following species were recorded on the shingle banks in and adjoining the river:

Agrostis stolonifera
Carex leporina
Centaurea nigra
Digitalis purpurea
Glyceria fluitans
Impatiens glandulifera
Juncus articulatus
Juncus effusus
Leontodon autumnalis
Persicaria hydropiper
Persicaria maculosa
Phalaris arundinacea
Poa annua
Potentilla anserina
Ranunculus flammula
Ranunculus repens
Rumex acetosella
Rumex obtusifolius
Sagina procumbens
Senecio aquaticus
Stellaria alsine
Trifolium dubium
Tussilago farfara

Sparse vegetation on shingle banks beside the river.

Sparse Reed Canary-grass on shingle island within the river.

Rock armouring beside river

Along most of its course through the study area the south bank of the river is steep and much of it is reinforced by rock armouring, with trees and scrub (including Alder, Ash, Grey Willow, Rowan, Bramble, Gorse and Sycamore) lining its upper edge. The vegetation along the rock-armoured section of the bank includes moss-covered rocks, grassy ledges and scrub patches, and is too complex to map or readily assign to an NVC community. Some of the more prominent species include Hemlock Water-dropwort, Greater Woodrush, Reed Canary-grass, Giant Fescue, Indian Balsam and Opposite-leaved Golden-saxifrage.

East of the Millennium Bridge the rock armouring is replaced by a grassy strip dominated by Reed Canary-grass with occasional Hawthorn scrub, with associated plants including Hemlock Water-dropwort, Indian Balsam and Marsh Ragwort.

South of the river, looking down from top of bank.

Looking east along the south side of the river.

The following species were recorded on the steep river banks:

Acer pseudoplatanus
Achillea millefolium
Angelica sylvestris
Anthoxanthum odoratum
Athyrium filix-femina
Brachypodium sylvaticum
Carex leporina
Chrysosplenium oppositifolium
Cirriphyllum crassinervium
Cirsium palustre
Dactylis glomerata
Deschampsia cespitosa
Digitalis purpurea
Dryopteris filix-mas
Epilobium brunnescens
Epilobium montanum
Festuca gigantea
Fraxinus excelsior
Geranium robertianum
Geum urbanum
Hedera helix
Holcus lanatus
Ilex aquifolium
Impatiens glandulifera
Juncus tenuis
Lotus corniculatus
Luzula sylvatica
Mnium hornum
Oenanthe crocata
Phalaris arundinacea
Poa trivialis
Quercus petraea

Rosa arvensis
Rubus fruticosus
Rumex obtusifolius
Salix cinerea
Salix fragilis
Sedum anglicum
Senecio aquaticus
Sinapis arvensis
Sorbus aucuparia
Stachys palustris
Stellaria media
Ulex europaeus
Ulex gallii
Urtica dioica
Valeriana officinalis
Viola riviniana

Ditches

Ditches are present in several parts of the study area. The largest of these is east of the A487 at TN4. Smaller, more shaded ditches are present beside some of the hedges in the southern part of the study area although these only appear to be seasonally wet and only included a few areas with standing water at the time of the survey.

Ditch beside A487, with Greater Willowherb and Floating Sweet-grass.

Ditch beside hedge at TN8, with Water Pepper and Reed Canary-grass.

The species recorded in the largest ditches are summarised in the following table. The main bank species are also included. TN8 relates to a mostly shaded ditch beside a hedge, with relatively few wetland plants (the main ones including Remote Sedge, Water-pepper, Indian Balsam and Nettle). TN4 is the wider, more open ditch beside the A487, which has a

greater range of wetland plants. Neither is easy to place within an NVC category, although TN14 has some affinity with S22 *Glyceria fluitans* water margin vegetation and fragmentary stands of S28 *Phalaris arundinacea* tall herb fen. The shaded ditches at TN8 may be closer to the ground flora of a wet woodland community.

Table 13. Species recorded at ditches

Target Note	4	8
Acer pseudoplatanus	+	
Alisma plantago-aquatica	+	
Carex remota		+
Corylus avellana		+
Crataegus monogyna		+
Epilobium hirsutum	+	
Festuca gigantea		+
Festuca rubra		+
Filipendula ulmaria	+	+
Fraxinus excelsior		+
Galium aparine	+	
Galium palustre		+
Glyceria fluitans	+	
Heracleum sphondylium		+
Holcus lanatus		+
Holcus mollis		+
Impatiens glandulifera	+	+
Juncus effusus	+	+
Lathyrus pratensis		+
Lemna minor	+	
Oenanthe crocata	+	+
Persicaria hydropiper		+
Phalaris arundinacea	+	+
Potamogeton natans	+	
Potentilla anserina		+
Prunus spinosa		+
Ranunculus repens		+
Rosa canina		+
Rubus fruticosus		+
Rumex sanguineus		+
Salix cinerea		+
Solanum dulcamara		+
Typha latifolia	+	
Urtica dioica	+	+
Veronica chamaedrys		+

Ponds

Two small ponds are located either side of the disused railway line at TN10. These are largely shaded by Ash, Hazel, Grey Willow and Hawthorn, but appear to support permanent standing water and include several aquatic plants. Broad-leaved Pondweed is present in both ponds and the vegetation appears close to the published NVC A9 *Potamogeton natans* community, with a fringe of S22 *Glyceria fluitans* water-margin vegetation.

The following species were recorded in the ponds at TN10:

Callitriche sp.
Corylus avellana
Crataegus monogyna
Elodea nuttallii
Fraxinus excelsior
Glyceria fluitans
Juncus effusus
Leptodictyum riparium
Lysimachia nummularia
Persicaria hydropiper
Plantago major
Potamogeton natans
Ranunculus flammula
Ranunculus trichophyllus
Rosa canina
Rumex conglomeratus
Salix cinerea
Solanum dulcamara

Shaded pond at TN10.

Hedges and scrub

The majority of the fields within the study area are bordered by hedgerows. Most of these are dominated by Hawthorn and some have occasional Ash standards. Several of the hedges are associated with the remnants of old banks and shallow ditches but these features do not show any evidence of recent management. The hedges have a relatively low botanical diversity (although it is possible that a survey in the spring would record additional ground flora species) and the species composition appears to be limited to very common plants. Several linear belts of scrub have been grouped with the hedges for recording purposes, because they appear to support a very similar structure and range of species.

The plants occurring in the hedges were recorded as target notes, and these are summarised below. They are arranged as a constancy table to highlight the species that occur most frequently in the hedges within the study area. In terms of the NVC, the hedges and scrub would mostly be classified as W21 *Crataegus monogyna - Hedera helix* scrub, with fragmentary W24 *Rubus fruticosus - Holcus lanatus* underscrub adjoining some of the hedge margins. There are also a few small patches of W23 *Ulex europaeus - Rubus fruticosus* scrub associated with rocky ground

Table 14. Species recorded in hedges and scrub

Target Note	1	2	4	5	7	9	11	12	16	17	19	20	21	Frequency
Crataegus monogyna	+	+	+	+	+	+	+	+	+	+	+	+	+	V
Fraxinus excelsior		+	+	+	+	+	+	+	+	+	+	+	+	V
Rubus fruticosus	+	+	+	+	+		+	+	+	+	+	+		V
Urtica dioica	+	+	+	+	+	+	+	+	+	+	+	+	+	V
Corylus avellana	+	+	+	+	+	+			+	+		+	+	IV
Hedera helix			+			+	+	+	+		+	+		III
Prunus spinosa			+		+	+			+	+		+	+	III
Acer pseudoplatanus				+					+		+	+		II
Angelica sylvestris	+					+	+							II
Athyrium filix-femina			+			+		+	+		+			II
Cirsium arvense		+				+	+							II
Dactylis glomerata						+	+	+		+		+		II
Dryopteris filix-mas			+					+	+		+			II
Galium aparine	+				+	+	+		+					II
Geranium robertianum									+		+	+		II
Glechoma hederacea								+			+	+		II
Heracleum sphondylium	+	+	+		+	+								II
Ilex aquifolium							+			+	+		+	II

Target Note	1	2	4	5	7	9	11	12	16	17	19	20	21	Frequency
Impatiens glandulifera		+	+		+	+	+							II
Lonicera periclymenum						+		+	+					II
Mercurialis perennis									+		+	+		II
Rosa canina				+		+	+				+		+	II
Salix cinerea		+	+										+	II
Sambucus nigra		+		+	+		+		+					II
Stachys sylvatica			+						+	+	+			II
Acer campestre	+													I
Achillea millefolium			+											I
Agrostis stolonifera						+								I
Alopecurus pratensis							+							I
Anthriscus sylvestris										+				I
Arrhenatherum elatius									+					I
Calystegia sepium				+										I
Calystegia silvatica				+										I
Cardamine flexuosa						+	+							I
Carex remota						+		+						I
Centaurea nigra			+											I
Chamerion angustifolium									+					I
Circaea lutetiana								+						I
Cirsium palustre														I
Cirsium vulgare								+						I
Clematis sp.				+										I
Cornus sanguinea	+	+												I
Deschampsia cespitosa		+	+											I
Digitalis purpurea								+	+					I
Dryopteris dilatata						+		+						I
Elytrigia repens						+								I
Epilobium ciliatum			+											I
Epilobium hirsutum										+				I
Equisetum arvense	+													I
Euonymus europaeus				+										I
Eupatorium cannabinum									+		+			I
Fallopia japonica				+										I
Festuca gigantea					+									I
Filipendula ulmaria					+			+						I
Hieracium cf umbellatum			+											I
Holcus mollis									+					I
Juncus effusus						+	+							I
Kindbergia praelonga											+			I
Lapsana communis												+		I
Ligustrum ovalifolium				+										I
Lysimachia nummularia						+								I
Malus pumila						+								I
Myosotis laxa						+								I
Oenanthe crocata					+			+						I
Persicaria hydropiper						+								I
Phalaris arundinacea								+						I
Plantago lanceolata			+											I
Poa trivialis			+											I
Polypodium vulgare			+											I
Polystichum setiferum											+			I
Potentilla anserina						+								I
Pteridium aquilinum									+					I
Rosa arvensis									+					I
Rubus idaeus										+				I
Rumex acetosella										+				I
Sedum telephium									+					I
Senecio jacobaea			+											I
Silene dioica									+			+		I
Solanum dulcamara					+			+						I
Stachys palustris						+		+						I
Stellaria graminea										+				I
Torilis japonica										+				I
Trifolium pratense			+											I
Ulex europaeus										+	+			I
Viburnum opulus	+													I
Vicia cracca			+											I
Vicia sepium				+										I

Hedgerow at TN7.

Hedgerow at TN11.

Woodlands

Several areas of woodland are present to the north side of the river. These are discussed separately below.

The wooded strip between the river and the A487 (Target Note 14) supports a young broad-leaved plantation (including Ash, Alder, Hazel, Hawthorn, Rowan and Sessile Oak), with a small number of much older Pedunculate Oaks and occasional scrubby Willows lining the riverbank. The presence of conifer stumps and occasional self-sown Western Hemlock saplings suggests that this had previously been a coniferous plantation that has been restored to broadleaved trees relatively recently. The ground flora in the plantation includes several species typically associated with established woodlands, (including Bluebell, Enchanter's Nightshade, Yellow Pimpernel, Wood Speedwell, Yellow Archangel, Wood Sage, Great Woodrush, Hard Fern and Little Shaggy-moss) so it seems likely that there was woodland cover along this riverbank even before the conifers were planted. The ground flora also includes a number of non-native species, with Indian Balsam, Japanese Knotweed, Montbretia and Pick-a-back Plant all recorded. Herbicide spray has been used to control the Knotweed in some parts of the wood. This woodland is difficult to place within

the NVC because it includes a mix of several different elements. The closest matches appear to include W8 *Alnus glutinosa - Urtica dioica* woodland and W9 *Fraxinus excelsior - Sorbus aucuparia - Mercurialis perennis* woodland.

Young broad-leaved plantation at TN14

Old Oak and luxuriant woodland ground flora along riverbank at TN14

The eastern part of the wooded bank at TN14 was only viewed from the margins because it was considered too steep to access safely. This has a canopy that includes Alder, Ash and Sycamore, with Willows closer to the river level. It appears to have a relatively low diversity ground flora. The steep slope does not appear to have been subject to plantation management and supports several large patches of Japanese Knotweed and Indian Balsam.

The largest block of woodland is to the south-west of Ffridd at TN15, and this is shown in the Forestry Commission's Ancient Woodland Inventory 2011. This is an ungrazed woodland with a canopy of Sessile Oak, and lesser amounts of Pedunculate Oak, Ash and Sycamore. There is a patchy understorey of Hazel, Hawthorn, Holly and Blackthorn. The ground flora is mostly dominated by dense Bramble and Bracken, but there are a few more open areas; mostly on steeper ground with rock outcrops. The ground flora was difficult to assess at the time of the survey due to the dominance of the Bracken and Bramble, but a moderate number of ancient woodland indicator species were present, including Bluebell, Greater Stitchwort, Wood Sorrel, Hairy Woodrush and Yellow Pimpernel. Climbing

Corydalis was noted in the Bracken margin at the southern boundary and may also occur within the woodland. In terms of the NVC this woodland appears closest to the W10e *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland, *Acer pseudoplatanus - Oxalis acetosella* sub-community.

Ancient W10 woodland at TN15.

The woodland at TN18 east of the cycleway is accessed by livestock and has a relatively open, scrubby character. The canopy mostly comprises Sycamore and Ash, with Bramble, Hawthorn and occasional Hazel forming a patchy understorey. The ground flora is relatively species-poor, with the most prominent species including Nettle, Enchanter's Nightshade, Red Campion, Herb Robert, Dog's Mercury and Ivy. This woodland appears a reasonably good match with the NVC W8e *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland, *Geranium robertianum* sub-community.

Grazed W8e Ash woodland at TN18.

The woodland at TN22 is dominated by widely spaced old Sessile Oak and Ash trees on a rocky slope, supporting a low diversity ground flora with grasses, patches of Bracken, scattered Foxgloves and localised Indian Balsam. The woodland is accessed by sheep, and grazing appears to have limited the plant diversity and prevented the development of

any significant understorey. The wood is difficult to match with the published NVC communities; possibly due to the timing of the survey and effects of sheep-grazing, which limit the recording of ground flora. It has some elements of a fragmentary W11 *Quercus petraea - Betula pubescens - Oxalis acetosella* woodland.

Grazed woodland at TN22, with Sessile Oak, Ash and Bracken.

Table 15. Species recorded in woodlands

Target Note	14	15	18	22	Frequency
Acer pseudoplatanus	+	+	+	+	V
Circaea lutetiana	+	+	+	+	V
Crataegus monogyna	+	+	+	+	V
Fraxinus excelsior	+	+	+	+	V
Rubus fruticosus	+	+	+	+	V
Athyrium filix-femina	+	+	+		III
Atrichum undulatum	+	+	+		III
Corylus avellana	+	+	+		III
Digitalis purpurea		+	+	+	III
Dryopteris dilatata	+	+	+		III
Glechoma hederacea		+	+	+	III
Hedera helix	+	+	+		III
Impatiens glandulifera	+	+		+	III
Kindbergia praelonga	+		+	+	III
Lysimachia nemorum	+	+		+	III
Pteridium aquilinum	+	+		+	III
Quercus petraea	+	+		+	III
Silene dioica	+	+	+		III
Urtica dioica	+		+	+	III
Agrostis capillaris	+			+	II
Blechnum spicant	+	+			II
Carex remota	+		+		II
Dactylis glomerata		+		+	II
Dryopteris filix-mas		+	+		II
Epilobium montanum	+	+			II
Geranium robertianum		+	+		II
Hyacinthoides non-scripta	+	+			II
Juncus effusus		+	+		II
Lonicera periclymenum	+	+			II
Phyllitis scolopendrium	+	+			II
Prunus spinosa		+		+	II
Quercus robur	+	+			II
Rosa canina			+	+	II
Rumex sanguineus			+	+	II
Stachys sylvatica	+			+	II
Stellaria holostea	+	+			II

Target Note	14	15	18	22	Frequency
Veronica chamaedrys			+	+	II
Alliaria petiolata	+				I
Alnus glutinosa	+				I
Anthoxanthum odoratum			+		I
Brachypodium sylvaticum	+				I
Brachythecium rutabulum	+				I
Cerastium fontanum				+	I
Ceratocapnos claviculata		+			I
Chamerion angustifolium	+				I
Chenopodium album	+				I
Chrysosplenium oppositifolium	+				I
Crocosmia x crocosmiiflora	+				I
Cymbalaria muralis	+				I
Deschampsia cespitosa	+				I
Dryopteris affinis	+				I
Fallopia japonica	+				I
Galeopsis tetrahit				+	I
Galium palustre	+				I
Geum urbanum			+		I
Holcus mollis				+	I
Hypericum pulchrum	+				I
Ilex aquifolium		+			I
Isothecium myosuroides				+	I
Juncus bufonius				+	I
Lamiastrum galeobdolon	+				I
Lapsana communis	+				I
Ligustrum vulgare	+				I
Listera ovata	+				I
Luzula pilosa		+			I
Luzula sylvatica	+				I
Oenanthe crocata	+				I
Oxalis acetosella		+			I
Persicaria hydropiper				+	I
Polypodium vulgare		+			I
Polytrichastrum formosum				+	I
Rhytidiadelphus loreus	+				I
Rumex acetosella				+	I
Salix cinerea	+				I
Salix viminalis	+				I
Scrophularia nodosa	+				I
Sedum anglicum				+	I
Senecio aquaticus	+				I
Senecio jacobaea	+				I
Sorbus aucuparia	+				I
Spiraea sp.	+				I
Teucrium scorodonia	+				I
Tolmiea menziesii	+				I
Tsuga heterophylla	+				I
Ulex europaeus	+				I
Umbilicalis rupestris		+			I
Valeriana officinalis	+				I
Veronica montana	+				I

Disused garden centre

The disused garden centre at the edge of the industrial estate, at TN6, was only viewed briefly from the boundaries and through the locked gate. The flora comprises a weedy mix of common ruderal plants and several garden escapes, as well as larger ornamental trees, shrubs and perennials which are remnants from the former landscaping. The flora is not considered to have any significance for nature conservation, and no attempt was made to assign it to an NVC category.

The following species were recorded from the gate of the disused garden centre. (There are undoubtedly many other species present that were not recorded):

Acer pseudoplatanus
Aesculus hippocastanum
Alchemilla mollis
Alnus glutinosa
Anthriscus sylvestris
Arrhenatherum elatius
Aucuba japonica
Buddleia davidii
Chamerion angustifolium
Cornus sericea
Crataegus monogyna
Crepis capillaris
Fallopia japonica
Fraxinus excelsior
Geranium robertianum
Hedera helix
Holcus lanatus
Lapsana communis
Lonicera nitida
Lonicera periclymenum
Medicago lupulina
Prunella vulgaris
Rubus fruticosus
Urtica dioica

Disused garden centre at TN6 (not accessed for survey).

4. Evaluation

The nature conservation significance of the various plant communities was assessed in a geographical context, following the approach set out in 'Guidelines for Ecological Impact Assessment' (CIEEM, 2006). The criteria used to assist in the evaluation are summarised in Table 16.

The evaluation relates to the plant communities as individual stands of vegetation, to help to identify which are the most important. It does not consider them in combination as a whole site, or at a landscape scale.

Table 16: Evaluation of habitats

Level of Value	Habitats
International	Areas designated as Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites in response to European Directives and International Conventions.
National	Areas designated as Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), or equivalent for key areas, habitats and plant communities.
Regional	Areas of habitat of suitable size and quality to be considered for notification as SSSI (based on the Guidelines for the Selection of Biological SSSIs, JNCC 1998). Extensive areas of UK Biodiversity Action Plan (BAP) Priority Habitats. Extensive areas designated under the List of Species and Habitats of Principle Importance for the Conservation of Biological Diversity, WAG 2003.
County	Areas of UK BAP Priority habitats and extensive areas of Local BAP habitats; areas of Ancient woodland.
District/Local value	Areas of LBAP habitat. Important hedgerows classified under The Hedgerow Regulations 1997. Any non-designated habitat assemblage of moderate biodiversity value.

In this case there are no vegetation types that are considered to be significant in an international or national context. There are no designated SSSIs within the study area and none of the habitats were considered of sufficient botanical merit to qualify as being Regionally important for its flora. None of the plant species recorded is listed in the UK BAP or listed as being especially uncommon in the Wildlife Sites Guidelines (2008). The only species listed as being particularly notable in the guidelines is Climbing Corydalis, which is listed as a 'Contributory Species'. (In the guidelines the presence of 5 or more Contributory species is one of the criteria for evaluating a site as significant in a county context).

Climbing Corydalis below Bracken at the margin of TN15.

The vegetation of greatest value for nature conservation is the ancient woodland at TN15. This supports a good number of long-established trees and old woodland indicator ground flora species, and has been included in the Inventory of Ancient Woodland. This woodland block is therefore considered significant in a County context. The woodlands at TN14, 18 and 22 are of more limited plant diversity, with fewer old woodland indicator species. However, they do all have mature trees and a typical woodland ground flora, and the species list would almost certainly be increased if surveyed earlier in the year. The older ones at TN14 and 22 have been categorised as being of District value for nature conservation, while the less diverse parts of TN14 and TN18 are assessed as being of value in a local context.

The mown road verges supported a moderate range of plant species in an MG5 sward, but these were mostly limited to common and widespread species, or species that have apparently been introduced by seeding. Therefore the road verge grassland is not considered to be significant for nature conservation.

The MG6 and MG7 grassland habitats, and related cattle-poached open-vegetation communities are mostly of relatively low diversity, even after taking the timing of the survey into account, and most have no significant nature conservation value for their flora. The small areas of transitional grassland to the north of the river (Q26-27 and Q33-35) supported a slightly higher diversity and a survey earlier in the spring may confirm additional species; however, they are unlikely to be of any more than local nature conservation value. None of the weed communities are considered to be significant for nature conservation.

The MG10 marshy grassland community supports a small range of wetland plants, but none of these are of high value for nature conservation. The larger areas at Q1, 17 and 20 could be considered valuable in a Local context.

The U4 semi-improved acid grassland with patchy U4/ U1 on the rock outcrops is mostly quite species-poor and is becoming heavily encroached upon by Bracken, but it does support a moderate range of plants, including patchy wetland species and some plants limited to the rocks. It is likely that a survey earlier in the year would confirm more species in this habitat. However, semi-improved acid grassland is a relatively common habitat in this part of Wales, and this is not a particularly rich example. Overall, it is evaluated as being of Local value for nature conservation. The U20 Bracken community has a very low botanical diversity and is therefore not considered significant for nature conservation.

The hedges and scrub habitats mostly have a very limited range of canopy and ground flora plant species. None are considered likely to qualify as 'important' under the ecological criteria of the Hedgerow Regulations. The hedgerows undoubtedly provide habitat for other wildlife, but their flora is not considered important for nature conservation.

The ditches beside the hedges (e.g. TN8) are mostly very species-poor and their flora is not significant for nature conservation. The wider ditch at TN4 is less shaded and has a wider range of wetland plants and is considered valuable in a Local context.

The ponds at TN10 are considered significant in a Local context for their wetland plants, and they are also likely to be valuable for other wildlife.

The river and its associated shingle banks did not have much vegetation (although no wading was undertaken to check in mid-channel) and what was seen was limited to common species. The plant community of this section of river bank is only considered to be of Local value for nature conservation. (However, the river habitat is likely to support a good range of other wildlife, including birds, mammals and invertebrates, and is probably of at least county value if evaluating these additional groups).

A simple plan summarising the botanical value of the various areas is presented as Figure 2. The unhatched areas of vegetation within the study area are not considered to be of nature conservation significance for their flora.

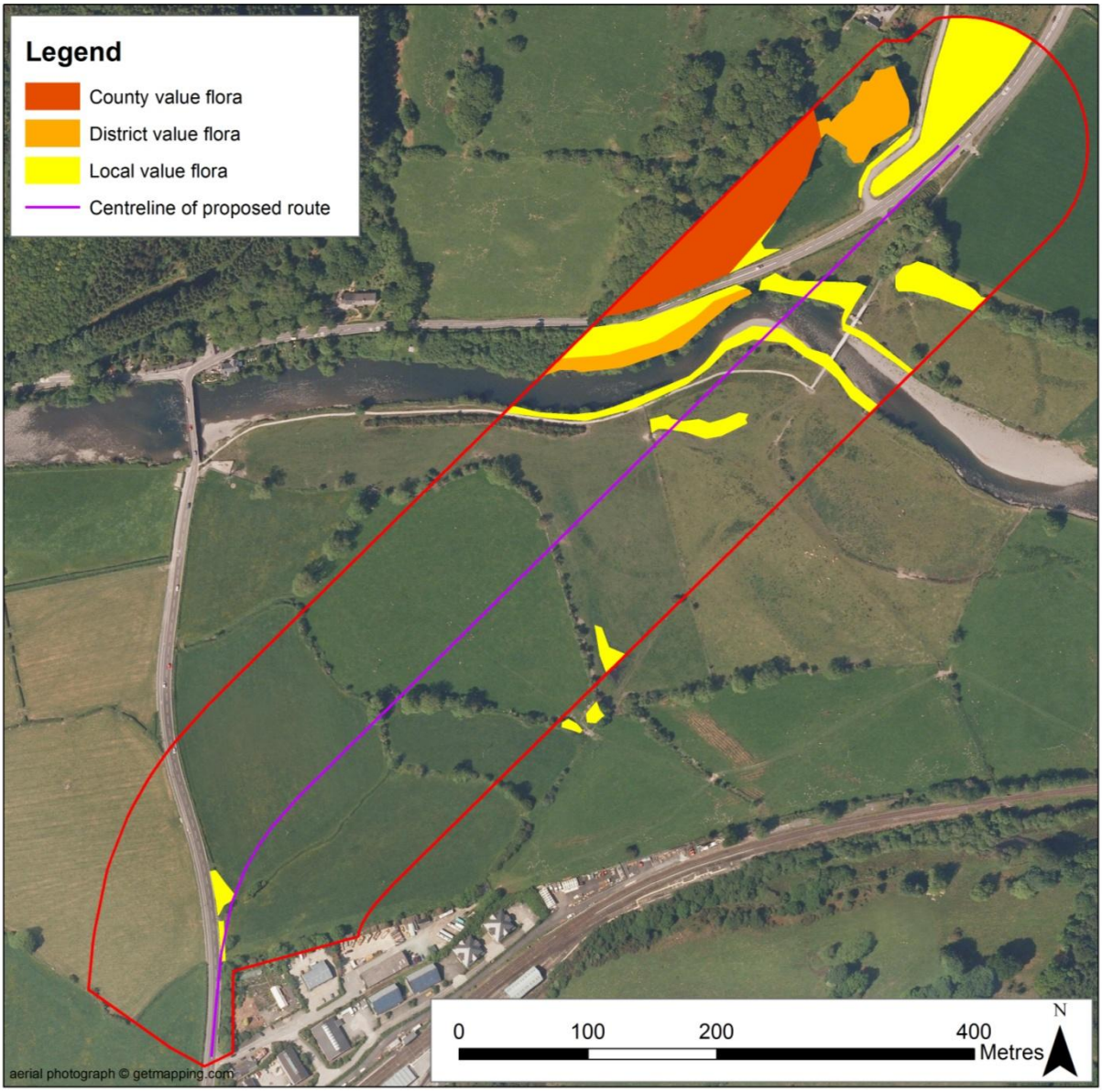

Figure 2. Summary plan showing areas of botanical value

Non-native invasive species are present in several plant communities, but especially the ditches and river-side woodlands. These have no value for nature conservation and can spread rapidly, to the detriment of native species. Species of particular concern at this site include Japanese Knotweed, Indian Balsam, New Zealand Pygmyweed and Montbretia. These are all listed in Schedule 9 of the Wildlife and Countryside Act, which makes it an offence to cause them to spread in the wild.

Japanese Knotweed on steep wooded slope at TN14.

Dense stands of Indian Balsam in woodland at TN14.

Montbretia on steep wooded slope at TN14.

New Zealand Pygmyweed at Q19.

5. Recommendations

The key recommendation for plant conservation would be to avoid any impacts on the woodland habitats that are of County and District value for their flora. Areas of Local value should also be avoided if possible. Mitigation should be provided for any areas of significance for their flora that would be damaged by the proposed project. The hedgerow and scrub habitats are generally species-poor and with only common plant species, and although they are not of high value for their flora, mitigation should also be provided for any that would be affected by the project because of their value as a habitat for other wildlife.

Special care must be taken to avoid any spread of Schedule 9 non-native invasive plant species during the construction work. It is strongly recommended that these are eradicated from the works area before construction work commences.

It was too late in the year to be certain that the spring flora had been properly recorded, and therefore a spring survey would be beneficial, especially in woodland areas and in grasslands managed by cutting and grazing. Further investigation of the steep wooded slope at TN14 would be especially beneficial because this is likely to be directly affected by the proposed bridge. Surveying the lower part of this slope would probably need at least 2 people, possibly using a rope for safety when working near to the water. Additional plant species are also likely to be recorded in hedgerows during the spring.

6. References

CIEEM (2006). Guidelines for Ecological Impact Assessment in the United Kingdom. Chartered Institute for Ecology and Environmental Management.

JNCC (2011). Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit. Joint Nature Conservation Committee, Peterborough.

Rodwell, J.S. (ed.) C.D.Pigott, D.A. Ratcliffe, A.J.C. Malloch, H.J.B. Birks, M.C.F. Proctor, D.W.Shimwell, J.P. Huntley, E.Radford, M.J.Wiggington, P.Wilkins, (1991 - 2000). British Plant Communities. Volumes 1-5. Cambridge University Press, Cambridge.

Wales Biodiversity Partnership (2008). Guidelines for the Selection of Wildlife Sites in Wales.

Appendix 1. Plant species list

The following species were all identified during the vegetation survey. However, due to the survey timing and nature of the sampling this should not be considered a comprehensive list of all plant species within the study area.

Scientific name	Common name
VASCULAR PLANTS	
Acer campestre	Field Maple
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Aesculus hippocastanum	Horse Chestnut
Agrostis capillaris	Common Bent
Agrostis stolonifera	Creeping Bent
Alchemilla mollis	Soft Lady's Mantle
Alisma plantago-aquatica	Water Plantain
Alliaria petiolata	Garlic Mustard
Alnus glutinosa	Alder
Alopecurus geniculatus	Marsh Foxtail
Alopecurus pratensis	Meadow Foxtail
Angelica sylvestris	Angelica
Anthoxanthum odoratum	Sweet Vernal-grass
Anthriscus sylvestris	Cow Parsley
Arenaria serpyllifolia	Thyme-Leaved Sandwort
Arrhenatherum elatius	False Oat-grass
Asplenium trichomanes	Maidenhair Spleenwort
Athyrium filix-femina	Lady Fern
Aucuba japonica	Spotted Laurel
Bellis perennis	Daisy
Betula pubescens	Downy Birch
Blechnum spicant	Hard Fern
Brachypodium sylvaticum	False Brome
Bromus hordeaceus	Soft Brome
Buddleia davidii	Buddleia
Callitriche sp.	Water Starwort
Calluna vulgaris	Heather
Calystegia sepium	Hedge Bindweed
Calystegia silvatica	Large Bindweed
Cardamine flexuosa	Wavy Bittercress
Cardamine pratensis	Cuckoo Flower
Carex caryophyllea	Spring Sedge
Carex laevigata	Smooth-stalked Sedge
Carex leporina	Oval Sedge
Carex muricata ssp. pairae	Prickly Sedge
Carex remota	Remote Sedge
Centaurea nigra	Common Knapweed
Cerastium fontanum	Common Mouse-ear
Ceratocapnos claviculata	Climbing Corydalis
Chamaecyparis lawsoniana	Lawson's Cypress
Chamerion angustifolium	Rose-Bay Willowherb
Chenopodium album	Fat Hen
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage
Circaea lutetiana	Enchanter's Nightshade
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Clematis sp.	Clematis (ornamental)
Cornus sanguinea	Dogwood

Scientific name	Common name
Cornus sericea	Red-osier Dogwood
Corylus avellana	Hazel
Crassula helmsii	New Zealand Pigmyweed
Crataegus monogyna	Hawthorn
Crepis capillaris	Smooth Hawk's-bit
Crocosmia x crocosmiiflora	Montbretia
Cymbalaria muralis	Ivy-leaved Toadflax
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot Grass
Deschampsia cespitosa	Tufted Hair-grass
Deschampsia flexuosa	Wavy Hair-grass
Digitalis purpurea	Foxglove
Dryopteris affinis	Scaly Male-fern
Dryopteris dilatata	Broad Buckler-fern
Dryopteris filix-mas	Male Fern
Elodea nuttallii	Nuttall's Waterweed
Elytrigia repens	Couch
Epilobium brunnescens	New Zealand Willowherb
Epilobium ciliatum	American Willowherb
Epilobium hirsutum	Greater Willowherb
Epilobium montanum	Broad-leaved Willowherb
Equisetum arvense	Field Horsetail
Euonymus europaeus	Spindle
Eupatorium cannabinum	Hemp Agrimony
Fallopia japonica	Japanese Knotweed
Festuca gigantea	Giant Fescue
Festuca ovina	Sheep's Fescue
Festuca rubra	Red Fescue
Filipendula ulmaria	Meadowsweet
Fragaria vesca	Wild Strawberry
Fraxinus excelsior	Ash
Galeopsis tetrahit	Hemp-nettle
Galium aparine	Cleavers
Galium palustre	Marsh Bedstraw
Galium saxatile	Heath Bedstraw
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill
Geranium robertianum	Herb Robert
Geum urbanum	Wood Avens
Glechoma hederacea	Ground Ivy
Glyceria fluitans	Floating Sweet-grass
Gnaphalium uliginosum	Marsh Cudweed
Hedera helix	Ivy
Heracleum sphondylium	Hogweed
Hieracium cf umbellatum	Hawkweed
Holcus lanatus	Yorkshire Fog
Holcus mollis	Creeping Soft-grass
Hyacinthoides non-scripta	Bluebell
Hypericum androsaemum	Tutsan
Hypericum perforatum	Perforate St. John's-wort
Hypericum pulchrum	Slender St John's-wort
Hypochaeris radicata	Common Cat's-Ear
Ilex aquifolium	Holly
Impatiens glandulifera	Indian Balsam
Juncus acutiflorus	Sharp-flowered Rush
Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
Juncus effusus	Soft Rush
Juncus tenuis	Slender Rush

Scientific name	Common name
Lamiastrum galeobdolon	Yellow Archangel
Lapsana communis	Nipplewort
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Leontodon autumnalis	Autumn Hawk-bit
Leucanthemum vulgare	Ox-eye Daisy
Ligustrum ovalifolium	Garden Privet
Ligustrum vulgare	Wild Privet
Listera ovata	Twayblade
Lolium perenne	Perennial Rye-grass
Lonicera nitida	Wilson's Honeysuckle
Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird's-foot Trefoil
Lotus pedunculatus	Greater Bird's-foot Trefoil
Luzula campestris	Field Woodrush
Luzula pilosa	Hairy Woodrush
Luzula sylvatica	Greater Woodrush
Lysimachia nemorum	Yellow Pimpernel
Lysimachia nummularia	Creepy Jenny
Lythrum portula	Water Purslane
Malus pumila	Apple
Matricaria discoidea	Pineappleweed
Medicago lupulina	Black Medick
Mentha x verticillata	Whorled Mint
Mercurialis perennis	Dog's Mercury
Myosotis laxa	Tufted Forget-me-not
Oenanthe crocata	Hemlock Water-dropwort
Origanum vulgare	Marjoram
Oxalis acetosella	Wood Sorrel
Persicaria hydropiper	Water-pepper
Persicaria maculosa	Redshank
Phalaris arundinacea	Reed Canary-Grass
Phleum pratense	Timothy
Phyllitis scolopendrium	Hart's-tongue Fern
Picea sitchensis	Sitka Spruce
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Poa annua	Annual Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Polygonum aviculare	Knotgrass
Polypodium vulgare	Common Polypody
Polystichum setiferum	Soft Shield-fern
Potamogeton natans	Broad-leaved Pondweed
Potentilla anglica	Trailing Tormentil
Potentilla anserina	Silverweed
Potentilla erecta	Tormentil
Potentilla reptans	Creeping Cinquefoil
Potentilla x mixta	Hybrid Cinquefoil
Prunella vulgaris	Self-Heal
Prunus laurocerasus	Cherry Laurel
Prunus spinosa	Blackthorn
Pteridium aquilinum	Bracken
Quercus petraea	Sessile Oak
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus flammula	Lesser Spearwort
Ranunculus repens	Creeping Buttercup
Ranunculus trichophyllus	Thread-leaved Water-crowfoot

Scientific name	Common name
Rhododendron ponticum	Rhododendron
Rosa arvensis	Field Rose
Rosa canina	Dog Rose
Rubus fruticosus	Bramble
Rubus idaeus	Wild Raspberry
Rumex acetosa	Common Sorrel
Rumex acetosella	Sheep's Sorrel
Rumex conglomeratus	Clustered Dock
Rumex obtusifolius	Broad-Leaved Dock
Rumex sanguineus	Wood Dock
Sagina procumbens	Procumbent Pearlwort
Salix cinerea	Grey Willow
Salix fragilis	Crack Willow
Salix viminalis	Osier
Sambucus nigra	Elder
Sanguisorba minor	Salad Burnet
Scrophularia auriculata	Water Figwort
Scrophularia nodosa	Common Figwort
Sedum anglicum	English Stonecrop
Sedum telephium	Orpine
Senecio aquaticus	Marsh Ragwort
Senecio jacobaea	Ragwort
Senecio vulgaris	Groundsel
Silene dioica	Red Campion
Sinapis arvensis	Charlock
Solanum dulcamara	Bittersweet
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aucuparia	Rowan
Spiraea sp.	Spiraea
Stachys palustris	Marsh Woundwort
Stachys sylvatica	Hedge Woundwort
Stellaria alsine	Bog Stitchwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Taraxacum sp.	Dandelion
Teucrium scorodonia	Wood Sage
Tolmiea menziesii	Pick-a-back Plant
Torilis japonica	Upright Hedge-parsley
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tsuga heterophylla	Western Hemlock
Tussilago farfara	Colt's Foot
Typha latifolia	Bulrush
Ulex europaeus	Common Gorse
Ulex gallii	Western Gorse
Umbilicalis rupestris	Navelwort
Urtica dioica	Nettle
Valeriana officinalis	Common Valerian
Veronica chamaedrys	Germander Speedwell
Veronica montana	Wood Speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Vicia cracca	Tufted Vetch
Vicia sepium	Bush Vetch
Viola riviniana	Common Dog-Violet
BRYOPHYTES (prominent species only)	
Atrichum undulatum	Common Smoothcap
Brachythecium rivulare	River Feather-moss

Scientific name	Common name
Brachythecium rutabulum	Rough-stalked Feather-moss
Calliergonella cuspidata	Pointed Spear-moss
Campylopus introflexus	Heath Star-moss
Ceratodon purpureus	Redshank
Cirriphyllum crassinervium	Beech Feather-moss
Dicranum scoparium	Broom Fork-moss
Eurhynchium striatum	Common Striated Feather-moss
Fissidens taxifolius	Common Pocket-moss
Homalothecium sericeum	Silky Wall Feather-moss
Hypnum lacunosum	Great Plait-moss
Isothecium myosuroides	Slender Mouse-tail Moss
Kindbergia praelonga	Common Feather-moss
Leptodictyum riparium	Kneiff's Feather-moss
Mnium hornum	Swan’s-neck Thyme-moss
Pellia epiphylla	Pellia
Pogonatum aloides	Aloe Haircap
Pogonatum urnigerum	Urn Haircap
Polytrichastrum formosum	Bank Haircap
Polytrichum juniperinum	Juniper Haircap
Polytrichum piliferum	Bristly Haircap
Pseudoscleropodium purum	Neat Feather-moss
Ptychomitrium polyphyllum	Long-shanked Pincushion
Racomitrium lanuginosum	Woolly Fringe-moss
Rhytidiadelphus loreus	Little Shaggy-moss
Rhytidiadelphus squarrosus	Springy Turf-moss
Thuidium tamariscinum	Common Tamarisk-moss

Appendix 2. Incidental fauna observations

Scientific name	Common name
AMPHIBIANS	
Rana temporaria	Common Frog
BIRDS	
Aegithalos caudatus	Long-tailed Tit
Ardea cinerea	Grey Heron
Buteo buteo	Buzzard
Carduelis carduelis	Goldfinch
Carduelis chloris	Greenfinch
Columba palumbus	Wood Pigeon
Corvus corone	Carrion Crow
Corvus monedula	Jackdaw
Delichon urbica	House Martin
Dendrocopos major	Great Spotted Woodpecker
Erithacus rubecula	Robin
Fringilla coelebs	Chaffinch
Hirundo rustica	Swallow
Mergus merganser	Goosander
Motacilla alba	Pied Wagtail
Motacilla cinerea	Grey Wagtail
Numenius arquata	Curlew
Parus caeruleus	Blue Tit
Parus major	Great Tit
Passer domesticus	House Sparrow
Phasianus colchicus	Pheasant
Pica pica	Magpie
Riparia riparia	Sand Martin
Sitta europaea	Nuthatch
Troglodytes troglodytes	Wren
Turdus merula	Blackbird
MAMMALS	
Apodemus sp.	Wood Mouse (opened Hazelnuts)
Lutra lutra	Otter (footprints)
Meles meles	Badger (setts, tracks, latrines)
Oryctolagus cuniculus	Rabbit (live sighting/ droppings)
Sciurus carolinensis	Grey Squirrel (live sighting)
Vulpes vulpes	Fox (droppings)

Appendix 3. Vegetation map

Legend

- Improved grassland (MG7)
- Species-poor semi-improved grassland (MG6/7)
- Species-poor semi-improved grassland with rushes (MG6)
- Semi-improved neutral grassland (MG6)
- Semi-improved acid grassland (U4)
- Amenity grassland (MG5)
- Marshy grassland (MG10)
- Broadleaved woodland
- Broadleaved plantation
- Hedge
- Standard tree
- Continuous scrub
- Scattered scrub
- Continuous Bracken (U20)
- Scattered Bracken
- Tall ruderal herbs
- Water
- Ditch
- Shingle
- Rock
- Building
- Road or track
- Fence
- Unvegetated concrete or wall
- Centreline of proposed route
- Quadrat
- Target note

0 50 100 200 Metres

N

Map 1. Pont ar Dyfi vegetation survey (south west part)

Legend

- Improved grassland (MG6/7)
- Species-poor semi-improved grassland (MG6)
- Species-poor semi-improved grassland with rushes (MG6)
- Semi-improved neutral grassland (MG6)
- Semi-improved acid grassland (U4)
- Amenity grassland (MG5)
- Marshy grassland (MG10)
- Broadleaved woodland
- Broadleaved plantation
- Hedge
- Standard tree
- Continuous scrub
- Scattered scrub
- Continuous Bracken (U20)
- Scattered Bracken
- Tall ruderal herbs
- Water
- Ditch
- Shingle
- Rock
- Building
- Road or track
- Fence
- Unvegetated concrete or wall
- Centreline of proposed route
- Quadrat
- Target note

0 50 100 200 Metres

N

Map 2. Pont ar Dyfi vegetation survey (north east part)