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NON-TECHNICAL SUMMARY

The value of roadside verges as a wildlife habitat has been recognised for some time; they are often the only remaining areas of semi-improved grassland still present in the modern landscape.

Some of the roads in Teesdale are historic routes connecting market towns and settlements, which pass through agricultural land within which are areas of important upland hay meadows. These traditionally managed meadows are rich in terms of the flora they support but are declining in area. Remnants of the hay meadow vegetation can still be found along some of the roadside verges of Teesdale, together with species that are rare or of local interest, of particular importance in this respect are the Lady's mantles. Given this information, the Teesdale Roadside Flora Project was based on the premise that the roadside verges in Teesdale were likely to be either currently of conservation interest or had the potential to become so.

The Teesdale Roadside Flora project was formulated with five main aims. These were as follows:

- To identify the most floristically diverse roadside verges and to locate rare or scarce species, so that they might be better protected.
- To identify verges which could be improved as a result of better management.
- To raise awareness of the biodiversity value of roadside verges within all sectors and user groups as well as to engender an appreciation of their role as fragments of a habitat (i.e. hay-meadow) that was once widespread throughout Teesdale.
- To make recommendations for management regimes which are beneficial in terms of improving the conservation value of the roadside verges in Teesdale.
- To provide a justification for these management recommendations.

The Teesdale Roadside Flora Project was undertaken by the Durham Biodiversity Partnership (with financial support from GlaxoSmithKline and Teesdale District Council), as part of the process of implementing the Durham Biodiversity Action Plan. The project had a range of key biodiversity objectives, which, in summary, set out to assist in the implementation of local, regional and national Biodiversity Action Plans for key species and habitats in Durham. These include Lady's mantles, Upland Hay Meadows, Upland Acid Grassland and Transport Corridors.

This report is constructed primarily from newly researched data in consultation with and underpinned by data from a range of organisations, including Durham County Council, English Nature, the Durham Wildlife Trust and Dr. Margaret Bradshaw. It identifies key management issues that may impact upon the floristic interest of the roadside verges in Teesdale and highlights those roadside verges which might benefit from improvements in management procedures. The

most important roadside verge sites in floristic terms have been mapped, as have the locations of scarce/rare Lady's mantles.

In total the survey encompassed almost 70 km of roadside verge between Barnard Castle and Middleton-in-Teesdale. Many of the roadside grasslands in the Teesdale Roadside Flora Project area were found to comprise either 'improved or semi-improved' grassland and consequently were found to be of only limited botanical value. The survey identified 19 high quality or 'red' sites on roadside verges, with a total length of 1.33 km. The total length of 'amber' (second tier) sites identified for the entire project area was 2.15 km, of which 1.43 km were classified as being of 'upper amber' quality.

The judgement of site surveyors working on the project was that the species diversity on Teesdale 'red' sites was higher than that encountered on similar sites in Weardale during the survey work undertaken during 2001 but that, in general terms, the roadside verges in Teesdale were 'less interesting' floristically. This is borne out by the average number of species recorded on red sites, which was 49.05 per site for red sites in Teesdale compared to 43.94 for red sites in Weardale. Furthermore, the length of all red verges, expressed as a percentage of the total length of surveyed verges in Teesdale 2002 was 1.9%, whilst that in Weardale (2001) was 5.45%. The equivalent figure for amber sites in Teesdale (2002) was 3.1% of the total length, and in Weardale (2001) 17.1%.

The report attempts to illustrate how the botanical composition of the roadside verges is representative of the valley's wider vegetation, as well as its land use and ecological history. In addition, the report makes a number of recommendations, which are designed to show how the favourable condition of the best roadside verges might be achieved, maintained and their value promoted to a wider audience.

PART I - INTRODUCTION & OVERVIEW OF THE TEESDALE ROADSIDE FLORA PROJECT

1. Introduction - The Durham Biodiversity Action Plan

1.1 Background to the Durham Biodiversity Action Plan

'Biodiversity' simply means the variety of life. The biodiversity action planning process was initiated in 1992, when the UK Government became a signatory to the International Convention on Biological Diversity at the 'Earth Summit' in Rio de Janeiro. In response to this commitment, the UK Government published 'Biodiversity: The UK Action Plan' in January 1994. This document recognised that for effective action to be taken, national targets needed to be translated to the local level. 'Action for Wildlife', the local Biodiversity Action Plan (BAP) for Durham, promotes the regionally relevant actions laid out in the United Kingdom's Biodiversity Action Plan.

Stephen Hughes MEP launched 'Action for Wildlife - the Durham Biodiversity Plan' (DBAP), on 29 January 1999. The DBAP is managed by a steering group comprising representatives from: the City of Sunderland, Darlington Borough, Durham County Council, Gateshead Council, South Tyneside Council, Durham Local Agenda 21, English Nature, Environment Agency, DEFRA, Northumbrian Water Ltd, RSPB, Tyne Tees FWAG and Durham Wildlife Trust,.

The Plan covers County Durham and the unitary authorities of the City of Sunderland, Darlington, Gateshead and South Tyneside. The main objective of the DBAP is to ensure that the biodiversity of these areas is maintained, enhanced or re-established.

The Teesdale Roadside Flora Project fulfils a range of key biodiversity objectives, which, in turn, assist in meeting local, regional and national Biodiversity Action Plan targets for key species and habitats in Durham. The Teesdale Roadside Flora Project contributes towards the delivery of the following Durham Biodiversity Action Plan targets:

- (i) Species Action Plan for 'Lady's mantles' - Targets 1, 2: Actions 1, 4, 5, 9
- (ii) Habitat Action Plan for 'Upland Hay Meadows' - Targets 1, 2: Actions 2, 3, 5, 6, 7
- (iii) Habitat Action Plan for 'Transport Corridors' - Targets 1, 2: Actions 2, 7, 9

1.2 The Policy Context of the Durham Biodiversity Action Plan

In the context of statutory Development Plans and the planning process, as Local Biodiversity Action Plans (LBAPs) become established, the Department for the Environment, Transport and the Regions (DETR, now the Department of Environment, Food and Rural Affairs [DEFRA]) has determined that these are intended "to have an increasingly important relationship with the

statutory planning process". This has been recognised at the regional level in the Regional Planning Guidance (2000), which indicates that, as part of their Local Agenda 21 (LA21) initiatives, and in partnership with other organisations, local authorities are expected to contribute towards Local Biodiversity Action Plans (LBAPs). In addition, the Local Government Act (2000), gives local authorities a duty to address biodiversity issues within their Community Strategies whilst the Countryside and Rights of Way Act (2000) requires local authorities to give 'due regard' to biodiversity. Adopting a biodiversity-friendly approach to the management of roadside verges in Teesdale should assist in delivering a range of strategic objectives featured in the local authority's LA21 and Community Strategies.

'Planning for Biodiversity in North East England' (2000) states that, "A successful biodiversity strategy requires more than the protection of formally designated areas and specially protected species, because such areas and species do not exist in isolation". It goes on, "Paragraph 24 of the Government's Planning Policy Guidance Note 9 emphasises the importance of land outside designated areas and the potential for creating new habitats alongside development". All of this has particular relevance to area-wide initiatives such as the Teesdale Roadside Flora Project.

The DBAP is a vital component of Durham's Local Agenda 21 Strategy. Implementation of 'Action for Wildlife', through initiatives such as the Teesdale Roadside Flora Project, helps to ensure that future generations will inherit an environment no less diverse than the one that we have inherited.

2. The Teesdale Roadside Flora Project

2.1 Introduction to the Project

The Teesdale Roadside Flora Project was developed as a complementary project to the work previously undertaken by the Durham Biodiversity Partnership on roadside verges in Weardale during 2001. In this context, the project sets out to meet many of the same objectives and to extend the recommendations of good practice in verge side management where appropriate, to the delineated project area within Teesdale. Consequently the vision and specific biodiversity objectives of the project are largely similar to those for the Weardale Roadside Flora Project, although the geographical focus of the project is different.

The conservation value of roadside verges has been recognised for some time. It is estimated that roadside verges occupy approximately 212,000 ha in the UK, a considerable area. Today, in intensively-farmed surroundings, old undisturbed roadside verges are often the only remnant of unimproved semi-natural grassland to be found in the modern landscape. By way of contrast,

many recently constructed roads do not have this historic link with semi-natural vegetation and its associated wildlife.

The roads in Teesdale, particularly the routes between Barnard Castle and Middleton-in-Teesdale, the B6278 and the B6277, are historic routes which have been important for the distribution of local agricultural products for many centuries. A visual assessment of the roadside verges along these and many of the minor roads in Teesdale is sufficient to reveal that some verges are of considerable importance for nature conservation, and to indicate that others could be substantially improved by more appropriate management.

The landscape of Teesdale is of particular note for its hay meadows. Whilst the best of these are located in the upper dale, there are some good examples at lower altitudes, particularly between Eggleston and Middleton-in-Teesdale. Over centuries, traditional management has created meadows that are rich in plant species, including a number that are rare and/or localised, such as the Lady's mantles *Alchemilla acutiloba* and *Alchemilla monticola*. In some locations, small amounts of this habitat, and some of the rare species, can be found in the dale's roadside verges. There is only limited data available on past changes in the area of upland hay meadow nationally, but it is thought that there has been a more than 45% decrease since 1945.

It was in the context of this overall national picture that the Weardale Roadside Flora Project was conducted in 2001 and from that work was developed the Teesdale Roadside Flora Project in 2002. The value of the traditional upland farmed landscape in the dales of western Durham, in terms of nature conservation, cultural associations, landscape character and aesthetic appeal is well recognised and evidenced by the multiple designations (ESA, AONB, NNR, SAC) that pertain to the area. With some species-rich areas of grass verge still present by some roads and the potential for improvement in other areas, it was considered that the identification and preservation of even small fragments of species-rich grassland or areas with rare species would be a worthwhile undertaking.

This project was made possible by sponsorship from GlaxoSmithKline, with additional financial support from Teesdale District Council. The Durham Biodiversity Partnership gratefully acknowledges their support and generosity.

2.2 Project Vision

The vision of the Teesdale Roadside Flora Project is:

"The best roadside grassland verges in Teesdale will be viewed as an asset in terms of the diversity of wildlife they support and their aesthetic appeal. They will ultimately be perceived as an integral part of the wider landscape, to be enjoyed and highly valued by local communities and visitors alike"

2.3 Project Location

The Teesdale Roadside Flora Project was located in Teesdale, between Barnard Castle and Middleton-in-Teesdale. During the project, almost 70 km of roadside verges were surveyed, principally along the loop described by the B6278 and B6277, between Barnard Castle and Middleton-in-Teesdale. In addition, selected 'connecting' by-roads were also included. These included, the roads between Eggleston and Mickleton and the loop that runs from Eggleston to Hill Top, just west of the Blackton Beck bridge and then down to the B6281.

2.4 Aims of the Teesdale Roadside Flora Project

The general aim of the Teesdale Roadside Flora Project is as follows:

"To secure permanent protection and improved management for the most floristically diverse and typical of Teesdale's grassland roadside verges"

Within this overall aim, the Teesdale Roadside Flora Project had a number of key biodiversity aims:

- To encourage and facilitate the improvement of the biodiversity resource across the area of the Teesdale Roadside Flora Project
- To increase the area of DBAP priority habitats (e.g. upland hay meadows), the populations of target species (e.g. Lady's mantles) and improve the quality and management of target habitats (e.g. transport corridors) within the project area.
- To recreate some of the lost grassland biodiversity capital previously present within Teesdale.
- To offer support to schemes that will result in a greater understanding and appreciation of biodiversity amongst all local communities within the valley.
- To build upon the work of the Weardale Roadside Flora Project, in order to create a better understanding and appreciation of the importance of roadside verges as a biodiversity resource in the context of the whole of the North Pennines AONB

It is anticipated that the outputs from the project will help to raise awareness of nature conservation issues in the Teesdale area particularly as they relate to upland hay meadows and roadside verges and inform any proposals for improving the quality of roadside habitats more generally. This should assist in protecting and extending the floristic interest of the grassland swards at selected key sites by protection and/or active management.

The primary purpose of the survey was to identify roadsides of high botanical interest. These included those areas beyond the immediate road verges with the greatest floristic diversity, the most representative suite of 'hay meadow' species or features of special interest/importance, such as populations of the nationally scarce Lady's mantle species, *Alchemilla acutiloba* and *Alchemilla monticola*. These were identified and mapped to ensure their protection against future damage from engineering works or inappropriate verge side management regimes.

It is hoped that the information detailed in this report will help secure the long-term floristic interest and greater awareness of a number of Teesdale's most botanically diverse roadsides. This should provide a number of benefits for local communities, not least the maintenance of the visual quality of the dale's flower-rich roadsides for the foreseeable future.

2.5 Lady's Mantles

Lady's mantles "flourish in Teesdale, in habitats formed by and largely dependant on man for their continuing state" (Bradshaw 1962). Lady's mantles (*Alchemilla* species) are a group of closely related plants that are extremely difficult to distinguish from one another, except by experts. This is, in large part, because they are able to reproduce asexually by the production of viable seed without the need for pollination. This is known as apomixis and has given rise to several different forms, all of which are very similar in appearance. The plants have attractive, fan-like leaves and large numbers of small yellow-green flowers. The leaves were reputed to fold up at night and catch dew on their soft hairs. Plant dew was highly prized by early herbalists and *Alchemilla* was prescribed for wounds (to stop bleeding), infertility and impotence. The alchemists also required the 'purest dew' in their attempts at turning base metals into gold. This led to the name *Alchemilla* or "little alchemist". In the Middle Ages, the herb was given the English name 'Our Lady's Mantle'. This has been abbreviated to give rise to their current name - Lady's mantle.

There are thirteen species of Lady's mantle in the UK of which three are widespread, though scarce in the south and east. The greatest diversity of *Alchemilla* species occurs in the North Pennines. Nine species grow in the Durham area, of which six are rare. Three are listed in the Red Data Book: *Alchemilla acutiloba*, *A. monticola* and *A. subcrenata*, and two further species are nationally scarce: *A. glomerulans* and *A. wichurae*. Bradshaw (1962) undertook an extensive

survey of five of the six rare species present in the meadows and pastures of Teesdale. A substantial resurvey has now been almost completed and their present status will be clarified on publication of the results of this work.

The Red Data Book species *Alchemilla acutiloba* is almost entirely confined to Weardale and Teesdale. It was much more abundant and widespread in Weardale but can be found in a number of locations in Teesdale. It is a plant of traditionally managed hay meadows where cutting is delayed until after the seed has set and was once abundant in some lengths of road verge, where the sward has not been significantly 'improved' by re-seeding or heavy fertiliser applications. In the UK *Alchemilla monticola* is almost entirely restricted to Teesdale and is found principally in old hay meadows, where it was once abundant, but it is also found in some roadside locations. The other scarce Lady's mantle species in Teesdale, i.e. *Alchemilla wichurae*, *A. subcrenata* and *Alchemilla glomerulans*, are mainly confined to the upper dale, principally in hay meadows.

Three species of Lady's mantle *Alchemilla monticola*, *acutiloba* and *subcrenata* are identified in the regional biodiversity audit (Brodin 2001), as being of particular importance in the context of the region. The main threats highlighted for these species is a cessation to traditional management techniques on hay meadows, agricultural improvements to grassland sites and unsympathetic cutting regimes on roadside verges.

Alchemillas are declining across their range. Their ability to colonise new sites is limited as fewer and fewer suitable sites are currently available for colonisation. Threats to *Alchemillas* growing on roadside verges include road realignment, minor road straightening and the dumping of earth on verges. Nutrient-rich run-off, along with the over-zealous cutting of road verges has resulted in a less rich verge flora, while the strengthening and widening of farm tracks and excessive cutting around farm access roads has also resulted in plants being lost.

Historically, the Durham Lady's mantles and plants such as globeflower (*Trollius europeus*), wood crane's-bill (*Geranium sylvaticum*) and melancholy thistle (*Cirsium heterophyllum*) would have been in the tall-herb flora of the open woodlands and sub-alpine pastures from which the meadows were created. Further consideration of the significance of the historical ecology of Teesdale can be found in the following section.

2.6 Roadside Flora - The Historical Context

This section attempts to illustrate how the history of Teesdale, in terms of its settlement, ecology and development, reveals how vegetation types and habitats have developed and how these relate to the current biodiversity of the roadside verges.

The history of the Teesdale area reveals that hay meadows, Lady's mantles and transport corridors have all played an important role in the development of the landscape that is seen today. In order to understand how hay meadows and Lady's mantles are part of the historical biodiversity of Teesdale, it is necessary to go back in time to 3000 BC. It is assumed that meadow habitats suitable for *Alchemilla* spp. would have been present at this time (Bradshaw, 1962).

From the eleventh century onwards, large areas of the Pennine dales, including Teesdale continued in a near-natural state. Today, the striking similarity between the hay meadows and the ground flora of the North Pennines ash woodlands is of note. It is considered likely that the hay meadows derive from the clearance of such woodlands and have been maintained since by regular cutting and grazing.

During the seventeenth and eighteenth centuries, there was a great increase in lead mining in Teesdale and consequently in settlement, employment and the enclosure and management of previously uncultivated ground. The miners, who were also part-time farmers, built their holdings as near to the mines as possible. Consequently meadows were maintained well above the normal limits of cultivation. In 1810, the presence of good quality upland meadows, which were on good soils and well dunged, was noted. This was apparently the same management regime that was continued till the 1960s in hay meadows, where high densities of *Alchemilla* spp occurred (Bradshaw, 1962) west of Barnard Castle.

At the same time as the Industrial Revolution, there was a great expansion of agriculture in Teesdale. Much of this land went out of cultivation during the agricultural depression in the 1870s and presumably reverted to grass, with *Alchemillas* (Bradshaw, 1962).

The development of roads and railways led to the establishment of man-made habitats for wildlife including railway and roadside verges. Subsequently these may have been more important than the presence of meadows in the current distribution of some *Alchemillas*. For example, in Weardale higher frequencies of *Alchemilla acutiloba* around Wearhead may have developed when Burnhope Reservoir was opened in 1936.

At present, *Alchemilla acutiloba* may be more frequent on some roadside verges than in meadows. It may be that the verges now provide some of the most favourable conditions for this plant as today, traditionally managed hay meadows are much reduced in frequency, only relatively small areas remain.

2.7 Roadside Flora - The Socio-Economic Context

As well as being rich in biodiversity, many of Teesdale's most floristically diverse roadside verges are an attractive visual amenity for local people and visitors to the dale. The best of them provide an appropriate and appealing visual context for the dales' settlements, such as Eggleston, Mickleton, Romaldkirk and Cotherstone. The most floristically rich roadside verges remain as a broken linear remnant of a once much more widespread landscape feature, the dales' upland hay meadows. As remnants of this formerly much more widespread resource, the verges are also important in a historical context.

The Teesdale verges and their flora are the product of, or a refuge from, not just specific agricultural management but also the wider socio-economic context. A context, which has dictated that, for the purposes of easier and faster vehicular movement, roads in the dale required re-aligning and straightening. Consequently the best suite of floristically-rich verge sides tend to be clustered in those areas that have not been impacted upon by extensive road engineering or, conversely, where the engineering works have facilitated the reversion of the verge side vegetation to its more 'natural' composition.

2.8 Current Management of the Roadside Verges in Teesdale

Most verges, and their management, are the responsibility of the County Council Highways Department (Durham County Council) and are managed via contractors. The management of verges is contracted out. The Highways Authority has legal rights over the verge and powers to enable them to provide drainage, lay-bys, signposts and footpaths.

In terms of highway maintenance, it is essential that some management of roadside verges be carried out. The over-riding reason for this is safety. The maintenance of sightlines and road signs is imperative for the safety of both road users and pedestrians. The level of management implemented by highway authorities is closely linked to economics (i.e. the budget that is available to the relevant local authority). The recommendations made in this report are not at any point intended to compromise safety. Rather, they seek to reduce work that is currently being undertaken and is unnecessary in terms of maintaining the safety of road users but which damages wildlife habitat, and divert this effort to the protection and enhancement of specified areas of roadside verges.

The "Policy for the Management of Roadside Verges" which was approved by the Environment Sub-Committee of Durham County Council on 6th March 1995 recognises the value of roadside

verges, both as a wildlife habitat and in terms of their visual attraction. It includes the following guidelines:

"Embankments and cutting slopes and verges except visibility areas should not normally be cut" -
DCC, Environment Department, 1995

"For County roads in rural areas in Durham this (the guidelines) amounts, in practice, to a single swathe of about 1.2 metres being cut with a flail along the edge of the carriageway normally twice a year. In some areas in the west of the County where growth is slower and which are particularly rich in wildflowers such as the melancholy thistle this second cut is neither required nor desirable. Cutting of the area behind this "safety zone" is variable but should normally be undertaken once every five years. As this zone is likely to be an area of importance for flowering plants and associated insects this cut should not take place until August at the earliest, in order that the wild plants can first set seed and insects complete their lifecycle. In the western part of the County, where the climate is cooler and the rate of plant growth is correspondingly more restricted, cutting of this intermediate area may not be necessary. A swathe next to the hedge bottom should always be left uncut to provide adequate cover for birds and mammals in particular." - DCC, Environment Department, 1995

Survey work, undertaken as part of this project, revealed very considerable anomalies between how current grass-cutting procedures are implemented and the guidelines recommended in the 'Policy for the management of Roadside Verges'. In summary, this amounted to a large area of additional grass-cutting being done with all of the consequent impacts on the biodiversity value of many verges in the dale.

3. The Project Area

The Teesdale Roadside Flora Project was entirely located in Teesdale, along a loop of roads and connecting by-roads between Barnard Castle and Middleton-in-Teesdale. The project area commenced at the end of the 30 mile an hour speed restriction on Harmire Road, Barnard Castle (i.e. the B6278), continued in a north westerly direction towards Folly Top and Eggleston and from there along the B6282 to Middleton-in-Teesdale. From Middleton-in-Teesdale, the project headed south-east along the B6277, back towards Barnard Castle, via the settlements of Mickleton, Romalldkirk, Cotherstone and Lartington. Ending at the commencement of the 30 mile an hour speed restriction at Startforth. In addition, verges were surveyed along the B6278 – from Eggleston through Hill Top to Blackton Beck Bridge and from there along the minor road south west that rejoins the B6278 near Swinkly Knoll – and along the length of the B6281, between

Eggleston and the road junction with the B6277, between Mickleton and Romaldkirk. The project area includes land in a single extensive local authority, Teesdale District Council. The Highways Authority for the project area is Durham County Council.

The whole of the project area is covered on Ordnance Survey 1:50 000, Landranger Map 92 , 1:25 000 Explorer Map OL31. Also see the map inserts at the rear of this report.

3.1 The Teesdale Landscape

Teesdale, the upper portion of the valley of the River Tees, is situated in northeast England, in the county of Durham. The River Tees rises on the highest summits of the Pennine hills and makes its way to the North Sea at Teesmouth, some 110 km to the east along the river's course, in a valley system that has a roughly west to east orientation.

The valley is characterised by geographical factors which pertain most strongly to the western dales of the Durham area including former glaciations, altitude, climate and geology but it has also been heavily influenced by mining, quarrying and more localised factors such as agricultural land usage and drainage. The project envelope falls entirely within English Nature's North Pennines Natural Area. The North Pennines are located at the northern end of the Pennine chain and form a separate and distinct area of upland landscape comprising high moorland ridges divided by broad pastoral dales. The remote moorland summits and high plateaux of blanket bog experience high rainfall with cold winters and short summers. Below these, broad ridges of heather moorland and acid grassland are managed for game and sheep respectively. The landscape is typified by exposed fells, bounded by dry stone walls and species-poor hedgerows contrasting with the sheltered dales of pasture and hay meadows, with small stone-built villages and scattered farmsteads.

Human influences, notably agricultural usage and reservoir construction, has had a considerable impact on the Teesdale landscape. Quarrying and to a lesser extent, lead, silver, zinc and barytes mining, have also left their mark.

The biodiversity value of the valley is very high indeed, the upper dale having probably the most important, botanically-rich habitats in England. That said, the wildlife value of the mid and lower dale has undeniably declined in recent generations. This situation is reflected in the flora of the roadside verges.

3.2 Geomorphology and Geology of the Tees Valley

This section concentrates on a description of the physical features of the dale - the geomorphology and underlying geology of the valley. The DBAP area, i.e. most of the 'old' County of Durham, is largely an upland one, much of its surface rising to more than 150 m above sea level. The geomorphology of the DBAP area can be considered as four main units, which largely comply with English Nature's Natural Areas profiling of the region. The most pertinent of these is the North Pennines, within which the project envelope is situated.

The Pennine Uplands cover the whole of the western portion of the DBAP area, with extensive tracts of heather moorland and blanket bog, the highest point being at 746m at Burnhope Seat, in Weardale. These uplands have high rainfall and poor fertility. Much of the ground is above 600m and is covered with blanket peat.

The fast flowing upper reaches of the Tees, the Wear, and in the northwest, the Derwent, drain the uplands of the DBAP area. The topography of the Durham BAP area is delineated by its three main rivers, the Wear forms its heartland and the Tees, over a portion of its length, the southern boundary.

The Tees drains from some of the highest summits of the Pennines in the west, rushing down its upper stretches over waterfalls and cascades of considerable magnitude (e.g. Cauldron Snout and High Force) and then more slowly along its middle reaches, and finally through the meandering lower reaches to empty into the sea via the once extensive Tees marshes.

Much of the present landscape of the dales has been fashioned by processes generated by the extreme, cold climates of the Quaternary, the most recent period of geological time. The glacial deposits of till, sands and gravel, which cover most of the solid geology of the Durham area, were laid down during the most recent cold phase, the Devensian. The onset of the Devensian period commenced some 75,000 years before the present, with the advance of ice across the British landscape commencing some 26,000 years ago. Subsequent ice retreat found all of Britain free of ice cover by 13,000 years ago.

The underlying geology of the North Pennines is dominated by Carboniferous limestone, which is somewhat complex in nature. The Carboniferous rocks are divided into the following sequence (in ascending order) Carboniferous limestone (Dinantian, 350 - 333 Ma), Millstone Grit and shale (Namurian, 333 - 318 Ma) and Coal Measures (Westphalian, 318 - 303 Ma). The boundary between the limestones and the grits is known as the Yoredale Succession and is made up of a sequence of limestones, shales, sandstones, grits and coal. The sequence indicates the changes

in the seas during the Carboniferous period from clear water oceans (limestone) to muddy seas (shales) to swampy estuaries and deltas (current-bedded sandstones and grits).

The most prominent geological features of the upper dale are the complex outcrops of the igneous Great Whin Sill and associated features, such as the Teesdale 'sugar' limestone - the latter being so influential in determining the distribution of some of the specialised flora of the extreme upper dale. By and large, the solid geology of much of the upper Tees Valley is associated with the Whin Sill, Lower Carboniferous rocks and, to a lesser extent, Millstone Grit. The project area itself features some small roadside outcrops of sandstone, principally in the Whistle Crag/Heatherlea area.

3.3 Soils and Climate

The soils of the Tees valley bottom are typically brown earths of low base status - they are deep, reasonably well drained on the lower slopes, and a mixture of fine and coarse loams. Above this, on the lower valley sides, the soils are surface water gleys that are seasonally waterlogged. These soils, which have distinctive topsoil, are referred to as stagnogleys. Higher up the valley slopes, the stagnogleys are replaced by stagnohumic gleys. These soils are slowly permeable, seasonally waterlogged fine loamy soils with a peaty surface horizon.

The climate of the valley is typical of the western part of 'County Durham', with a mean annual rainfall of over 1600 mm per annum at the head of the valley decreasing to less than 800 mm per annum further east. The mean temperature is 6°C over 7-8 months of the year.

3.4 Current Land Usage and Settlement

The main land uses in the Tees valley are for agriculture and game management. The first of these comprises up to three-quarters of the total land area of the upper dale, and the latter refers mainly to red grouse, but rough shooting is also well represented.

The industry of the valley is principally light and is concentrated around the dales settlements, usually in small, but in some cases expanding industrial estates, such as that at Harmire, Barnard Castle. The major exception to this is the large pharmaceutical unit, run by GlaxoSmithKline, at Barnard Castle - the largest single employer in the dale.

Much of the agricultural land in the dale is not of the highest quality, suffering as it does from poor drainage qualities and low nutrient status. Consequently, much of the farming is pastoral with small amounts of mixed farming lower down the dale. The main stocking systems comprise a

mixture of sheep with some cattle, and, at lower altitudes, a variety of arable crops. Large areas of the dale are used for pasture, with silage production, whilst some of the unimproved grasslands, where managed as hay meadows, especially upstream of Eggleston, are still very important for their wildlife.

In broad terms, the management system which applies to such meadows comprises the 'closing up' of the meadow in spring from any grazing. This allows the sward to develop to a height that will produce a useable crop of hay by high summer. Depending on weather conditions and the growing season, the hay crop will be taken in early to mid July, after which time the after-growth will be grazed by cattle or sheep. To such meadows, fertiliser inputs will usually be restricted to relatively small applications of manure, with occasional additions of lime, at low applications rates. The combined effects of these more 'traditional', low intensity methods is to maintain a colourful sward, that is rich in herbs and a wide variety of finer grass species (though undoubtedly less rich than the 'traditionally managed' meadows of 50 years ago), which also produces a hay that is both palatable to, and effective as a winter feed for, stock.

The population of the dale is relatively low at just under 25,000 people. The majority of these are concentrated in the ribbon of settlements scattered along the principal valley roads, the B6277 and B6287. In sequence these are Staindrop (on the A688), Barnard Castle, Eggleston, Lartington, Cotherstone, Romalldkirk, Mickleton, Middleton-in-Teesdale and Newbiggin. Smaller numbers of people are scattered throughout the dale in farming communities, isolated dwellings and small clusters including those at Forest-in-Teesdale and Harwood.

The project envelope is not particularly well served with public rights of way although there are a number of key routes which do relate to the area, and are very significant in terms of the dale as a whole. First amongst these is the Pennine Way. This is a national strategic route that connects to a number of the upper dale's most prominent landscape features, along a roughly south to north/north-west alignment. The Teesdale Way, from east to west follows the River Tees and describes an elegant loop, largely along one or other river bank, between Barnard Castle and Middleton-in-Teesdale. A filigree of other footpaths and bridleways connect to these and establish a network for access on foot across this part of the dale.

3.5 Broad Habitat Description and Biodiversity Issues

"The flora of upper Teesdale is (probably) more widely known [by botanists] than that of any other area in Britain, and yet perhaps only a few thousands who visit the dale each year realise the extent to which the vegetation and flora contribute to the essence of its character" (Bradshaw &

Clark, 1989 in 'Upper Teesdale').

It is the vegetational elements of the landscape that ultimately dictate the biodiversity content of an area, by determining the presence or absence of certain habitats. This section gives an overview of the main habitats present alongside the roads of Teesdale.

The broadly dominant, semi-natural habitat types present in the dale are grasslands of various types, with some ancient semi-natural and some plantation woodland. The grasslands in the valley are, by and large, mesotrophic with some calcareous influences in the upper dale, the most famous of the latter having developed on the renowned Teesdale 'sugar' limestone. There are few (if any) examples of unaltered, natural grasslands within the Project area. In most parts of the catchment, the dominant grassland usage is for sheep or cattle grazing, with silage production and, higher up the dale, hay cropping is also significant. The most commonly occurring type of unimproved grassland occurring in upper Teesdale is acid grassland although mesotrophic and calcareous grassland are also represented at those higher altitudes.

Some of the roadside meadows, and a number of the roadside verges in the dale have an abundance of flowering plants and exhibit a characteristic sequence of colour-shading through the year, which starts with a brilliant yellow blaze of dandelions in the early spring. This is followed by the creamy-white, aniseed-scented flowers of the sweet Cicely, whose umbels can be seen growing along roads, riverbanks and stream sides. Herb-rich meadows are still well represented in parts of the dale, especially considering the extent of loss of this habitat elsewhere in the UK, though even here there have been very considerable losses in both the area and quality of habitat over the last 50 years. Locally these grasslands are known as "herbie meadows", a colloquialism that is indicative of the abundance of wildflowers to be found amongst the usually more abundant grass species. Other colourful herbs to be found in these situations include pignut, wood cranesbill, sorrel (or 'soury dock') with the yellow flowers of autumn hawkbit prominent later in the summer. Scattered amongst the more widespread herbs can be found: patches of bistort; the damp loving ragged robin; marsh valerian; kingcup, and melancholy thistle's purple 'shaving brush heads'.

Across the project area, hedgerows remain a significant biodiversity features. This is particularly the case on the south side of the river Tees. Many of these, however, are species-poor and are frequently in a poor state of maintenance or repair - though not as acutely so as in Weardale or other parts of County Durham. Most hedgerows in the area comprise only one or two woody species per 30m of hedge, very rarely are there more than five such species present in any such length. The dominant hedge shrub is hawthorn, though elder, blackthorn, dog rose and hazel (in decreasing order of frequency) are all widespread. Hedgerow trees are not uncommon with the most commonly encountered species being ash, followed by oak and sycamore. Today, woodlands in the dale are of a largely recent plantation type and these comprise largely conifers.

There are a number of examples of smaller shelterbelt woodlands and copses in the project area and some smaller areas of ancient, semi-natural woodland.

PART II - PROJECT METHODOLOGY AND CONSTRAINTS

4 Methodology and Constraints

4.1 Project Methodology

In order to place the collected data into an appropriate context, a general literature search was undertaken and a consultation process undertaken with the following organisations and individuals: Durham County Council, English Nature, Durham Wildlife Trust, Dr Margaret Bradshaw and Chris McCarty (EN Site Manager for Moorhouse and Upper Teesdale National Nature Reserve).

Prior to commencing work in the field, staff from Durham County Council were consulted, including the Senior Conservation Officer and a Landscape Architect from the Landscape Section of the Environment & Technical Services Department.

The Teesdale Roadside Flora Project commenced in May 2002, fieldwork continuing through into July. The first part of the project was field-based and aimed to collect sufficient data to enable the most valuable verges, in terms of nature conservation, to be identified, classified and located on provisional maps.

The initial part of the fieldwork was a visual assessment of the roadside verges in Teesdale. This was undertaken during a slow drive along the loop of roads included in the project envelope. This enabled any areas of roadside verge in the dale which were obviously not of conservation value e.g. those having hard development or comprising bare ground to be eliminated from further survey work. In addition, verges that were very narrow or which supported only rank vegetation or no vegetation at all, were excluded at this stage. Approximately 67 km of roadside verge was assessed during the initial part of the project.

A 'walk-over survey' was then undertaken on the areas of roadside vegetation that had not been initially eliminated. This involved walking at a slow, even pace along the verge and visually assessing the range of species present and dividing the verges into sites that could then be graded as 'red', 'amber' or 'green'. The allocation of sites to a colour category was dependent on several factors, including the number of species present (see Appendix 6), the presence of rare or locally notable species and species composition as detailed below. The walkover survey covered over 50 km of roadside verge in total. The positions of all red and amber sites were noted using 8-figure grid references. The identification and location of Lady's mantle species was a particular aspect of this part of the project.

A more detailed survey was carried out on 'red' sites. At each site that was graded as red, the species present were identified and recorded on a recording sheet, which was designed for the project (see Appendix 7). The species present were recorded on two occasions, with a first visit in May and a later visit in July, to allow for seasonal changes in the flora. The presence of rare or notable species was also recorded. Records of significant species, other than plants, were also kept i.e. invertebrates, mammals, birds, reptiles and amphibia.

- Red sites - these were identified as being of 'prime botanical interest' as defined by species diversity (including the presence of Lady's mantles and other species which are rare or of local interest) and the suite of species present (e.g. MG3 - mesotrophic grassland). These sites represent a valuable conservation resource and should be protected.
- Amber sites - these were less diverse in terms of species number than red sites, but with appropriate management their conservation value could be enhanced. Amber sites were divided into two categories i.e. 'upper' or 'lower' amber. Sites classed as upper amber were considered to have the greatest potential, if managed appropriately, to become particularly valuable in terms of local biodiversity. Populations of Lady's mantles were present on some amber sites.
- Green sites - these sites had low levels of species diversity (typically only 5 or 6 species over a 10 m length of verge). They were characterised by rank, invasive species such as nettles, hogweed and thistles. Grasses present were dominated by vigorous fast growing species such as cocksfoot *Dactylis glomerata* and false oat grass *Arrhenatherum elatius*. Many of these sites were detrimentally affected by adjacent land use.

The usage of the terminology 'red', 'amber' and 'green' is intended to simplify the verge management recommendations for the contractors/grounds maintenance operatives. A green site can be managed as per DCC guidelines and a swathe of 1.2 metres wide cut (i.e. "go ahead"). Amber sites have an element of caution overlaying any recommended management proposals (i.e. "proceed with care") whilst red sites should have specific management recommendations for each site (i.e. "stop and consult before cutting or undertaking an operation").

4.2 Project Constraints

Project constraints were identified. The most significant of these were time and safety. During the survey period, safety of the fieldworkers was the greatest concern. The B6277 and B6278 are key

local routes between the dales settlements, in particular between Barnard Castle and Middleton-in-Teesdale. The roads are relatively busy and used by some large lorries and many agricultural vehicles, as well as cars. A number of the roadside verges are narrow and it was not always possible to carry out survey work on these because of the proximity of large, fast moving vehicles. To reduce the risks posed by the presence of the traffic, the surveyors always worked in pairs and wore fluorescent jackets, which were provided by GlaxoSmithKline.

As it was not possible to obtain a reliable mobile phone signal in much of Teesdale, all staff involved in fieldwork 'logged out' when they left for field based operations and then logged back in when they returned to the Durham Biodiversity Partnership's office base at Rainton Meadows, Houghton-le-Spring, or 'signed off' for the day.

The extensive nature of the study area and the distances involved in reaching it from the office base of the field team meant that fieldwork time during the day was limited. Early on in the project planning phase, the option for locating the survey team in Teesdale overnight (to facilitate a longer working day) was considered but the necessity for this was discounted shortly after the survey work had commenced. This decision was based on an assessment of the survey team's effectiveness and the survey period available. As in all such surveys, the actual time available for survey work was limited by the length of the growing season and the flowering times of the plants themselves which, in turn, had implications for the ease of their identification.

The timing of the grass-cutting regime currently in operation, together with the excessive width of some of the swathes cut, impacted upon several sites initially identified as being of either red or upper amber potential, including a site close to Romaldkrik, which initial visual assessment indicated as of being high value, but was never adequately surveyed (for more detail see sub-section 5.4). Some sites were cut before any survey work had been done whereas others were cut between the first and the second survey periods. Urgent review of some of the work undertaken by contractors is required should some of the best sites be protected from negative impact as a result of inappropriate and unnecessary cutting. Detail on red sites, potentially badly affected by over cutting are listed in the site 'Notes' listed in Appendix 1.

PART III - RESULTS

5 Project Outputs

5.1 Introduction

The maps, which accompany this report, clearly show the locations and extent of the red and amber sites identified during the survey. Verges within the project area and which are not marked as red or amber should be considered to be green (i.e. of low biodiversity status). The locations of scarce/rare Lady's mantles and other notable species that occurred outside red or amber sites were also noted during the field survey.

This results section of the report summarises the habitats observed and lists species recorded that were rare or of local interest as well as the presence of biodiversity priorities in the project area (i.e. species and habitats which are of direct relevance to the DBAP).

The sections which follow (Sections 6-8), includes discussion of/and broad management recommendations for the verges in the project area. The implementation of these recommendations will assist the Highways Authority to manage the verges in a manner that is beneficial in terms of their conservation value, whilst not being detrimental in terms of road safety or function.

5.2 General Comments & Summary of Habitats as Observed During Fieldwork

As was observed in the work undertaken in Weardale during 2001, the roadside verges which the project identified as being of the highest value, in terms of their botanical composition were largely those which extended for some distance beyond the immediate roadside verge (i.e. wider than *circa*. 1.2 m). The crucial issues, in this respect, seem to relate to the grassland's distance from the negative influence of salt spray, passing traffic and summer verge management (i.e. grass-cutting).

One rather obvious feature of the verges within the Teesdale Roadside Flora project envelope was the preponderance of plants recorded that could be considered 'garden escapes', particularly in the Barnard Castle area. These included flowering plants such as *Montbretia*, a number of showy members of the *Compositae*, Welsh poppy and the Lady's mantle *Alchemilla mollis* as well as shrubs such as lilac, the cultivated form of gooseberry, black currant, red currant and domestic apple. The latter suite of species have an obvious linkage back to the old-fashioned type of

cottage garden or small holding, which accommodated many fruit-bearing plants and would once have been a widespread feature of the dale.

In general terms, Teesdale's roadside verges comprised grasslands that indicate their origins as mesotrophic hay meadow-type swards. Exceptions included some areas that clearly showed an acidic grassland influence and on very thin soils, heathland. In the main, the dale's roadside grasslands are degraded in terms of species complement and 'typicality'. In most locations this degradation seems to have resulted principally from road engineering works and/or a lack of appropriate management. Consequently, where floristic interest remains this tends to be represented by the taller, more robust herb species, such as the *Umbelliferae*, crane's-bills and in yet more degraded, nutrient-enriched grasslands, docks, thistles and rosebay willowherb *Chaemenion angustifolium*. In the least diverse situations, robust grasses such as cock's-foot *Dactylis glomeratus* dominate to the exclusion of all but a few herb species e.g. stinging nettle *Urtica dioica*.

5.2.1 Roadside Grasslands & the Teesdale Context

Many of the roadside grasslands in the Teesdale Roadside Flora Project area comprise either 'improved or semi-improved' grassland and consequently they are of only limited botanical value, although a small number of these do retain elements of a herb-rich sward. The 'improvement' of these verges has come about principally as a result of the piecemeal re-seeding of turf after persistent damage, such as over-riding, or as part of the restoration of verges after engineering works. Nutrient enrichment of verge swards has occurred over time, through the leaching of nutrients and the drift of sprayed inputs has accumulated as a result of the agricultural improvement of pasture and hay meadows on the 'agricultural side of the wall'.

At one time, large proportions of these roadside verges would have been herb-rich but many have been damaged, altered or 'improved' in a variety of ways. For example, most of the verges, on both sides of the B6278, between Harmire (Barnard Castle) and Folly Top, have been extensively modified (mainly in the last thirty years), as a result of road widening and straightening works. Higher up the dale, from the junction of the unclassified road between Hill Top and its junction with the B6282 ('up' stream of Eggleston), many of the most floristically rich roadside verges were congregated - especially (but not exclusively so) on the north verge of the road.

A number of the roadside meadows between Eggleston and Middleton-in-Teesdale are still managed in a way that retains much of their principal floristic interest. Good examples would include those on the north side of the road, west of the junction of the B6282 and the minor road opposite the entrance track to Eggleston Farm.

One aspect of Teesdale that is worth noting is that in the whole of the survey envelope, orchids were in relatively 'short supply' in roadside habitats. The only species noted were common spotted orchid *Dactylorhiza fuchsii* and northern marsh orchid *Dactylorhiza purpurea*, and these were only recorded at a couple of sites, with the sum total of the latter species amounting to only a single plant. The greatest number of orchids noted, consisted of a small colony of some 15 common spotted orchids on an upper amber site near to Startforth/Barnard Castle. This might be considered a contrast to many parts of the county, where these two species of common orchid are some of the most frequently encountered 'interesting species' in roadside verges.

The following interesting species occurred quite extensively on a number of the roadside verges in the project area, notably on red or upper amber sites, but not exclusively so: wood crane's-bill *Geranium sylvaticum*, meadow crane's-bill *Geranium pratense*, pignut *Conopodium majus*, cowslip *Primula veris*, meadow saxifrage *Saxifraga granulata*, black knapweed *Centaurea nigra* common bird's-foot-trefoil *Lotus corniculatus* and two species of the more widespread species of Lady's mantles *Alchemilla glabra* and *A. xanthochlora*.

The survey revealed a number of very good roadside verges in terms of their floristic interest. The best examples were:

- The verge side on the north side of the B6282, east of Stotley Hall, between the junction of the minor road to Stotley Grange and the edge of the plantation woodland on the southern verge. This site recorded five species of *Alchemilla* (including *A. acutiloba* and *A. monticola*) and had a total of 43 species documented for the verge.
- The site located on the south side of the B6277 just to the west of Romaldkirk. This location had a good representative flora, indicative of traditional hay meadows, with meadow saxifrage, adder's tongue fern and *Alchemilla monticola* all present.
- The site immediately to the west of the entrance to 'Toft Rigg' Farm on the B6282. This location had a very considerable population of meadow saxifrage as well as a representative mix of species that were indicative of a traditional hay meadow, such as hay rattle, ox-eye daisy and bulbous buttercup.
- An extensive site, occurring as a suite of scattered sub-sites around the meeting of the minor roads from Romaldkirk, Mickleton and Eggleston (Hayberries Junction) at NY995231. A total of 74 species of flowering plant were identified here, many of them indicative of a hay meadow flora, with other species including fairy flax *Linum catharticum* and quaking grass *Briza media*.

5.2.2 Results Overview, Section by Section - Barnard Castle to Eggleston (North of the Tees)

In terms of overall view, this section undoubtedly comprised the least botanically interesting suite of roadside verges in the project area – not a single red site was identified in this subsection of the project envelope. The vegetation along the roadsides of this part of the dale were very largely improved or semi-improved. By and large, the verges, especially between Barnard Castle and Folly Top, have been extensively modified relatively recently. Where more natural grasslands do exist in this section, these are somewhat representative of typical neutral hay meadow grasslands, although nowhere over this stretch can they be considered as anything other than depauperate in terms of their floristic composition.

One obvious feature of this area of the project envelope was the number of garden escapes that were recorded in the roadsides, both flowering plants such as *Montbretia*, and shrubs such as red currant and domestic apple.

Some of the more interesting vegetational elements along the road between Barnard Castle and Hill Top were the several colonies of melancholy thistle *Cirsium heterophyllum* – clustered in an area some 5 km north west of Barnard Castle - with one extensive site (covering approximately 100 m) located on the south verge around grid reference NZ021217. This is a species with a limited local distribution in the County and is of particular relevance to the hay meadow suite of species – though in this roadside location, other than a small number of plants of wood cranesbill, it was not growing in combination with a range of ‘typical’ species for this habitat. Sweet Cicely *Myrrhis odorata* was widespread and prominent in the verges over this section, and at Folly Top (opposite Handkerchief Plantation) there were a number of significantly sized colonies of *Alchemilla acutiloba* (5 m to 10 m in length) ~ a species which, where it does occur, is not unusually located in relatively species-poor locations.

5.2.3 Results Overview, Section by Section - Eggleston to Middleton-in-Teesdale (North of the Tees)

Without a doubt, this portion of the roadside survey provided the highest quality roadside verges in terms of the presence of both red and upper amber sites in the whole project area – 16 of the 19 red sites identified were located in this area. The vegetation on the roadside verges over this portion of the survey area grades from the upland hay meadow sward into a more acidic community, with small elements of heathland on one stretch of the north verge, close to Heatherlea. Typical species of acid grassland communities that were noted in this area included, purple moor grass *Molinia caerulea*, mat-grass *Nardus stricta*, field woodrush *Luzula campestris*,

heath bedstraw *Galium saxatile* and tormentil *Potentilla erecta*. Harebell *Campanula rotundifolia* was present in some considerable numbers in parts of these acidic grasslands, especially on the north side of the road, along the B6282 between Eggesburn Farm, and West Stotley. Around the sandstone outcrops located at Heather Lea and Whistle Crag, there was considerable botanical interest. In the former area, small patches of heathland, with heather (ling) *Calluna vulgaris* and bilberry *Vaccinium myrtillus*, were present, whilst the latter site was one of the most floristically diverse locations encountered during the whole survey period.

The best examples of the vergeside meadow-type grasslands in the survey envelope were concentrated along approximately 1.5 km of roadside verge along the B6282, between Sun Bank and Lane Head (close to Middleton-in-Teesdale), these were clustered principally along the north verge. These sites had a wide variety of representative species, a number of scarce species and in totality, might be considered as a linear remnant of previously present hay meadow. This, despite the fact that some elements of the verges were obviously relatively recent in terms of their actual development (for example, that at Low Thatch Lea).

Another cluster of sites, within which meadow saxifrage was a relatively prominent vegetational component, was clustered along a half kilometre stretch of the road that bisected Toft Rigg and Swinkly Knoll, west of Eggleston.

5.2.4 Results Overview, Section by Section - Middleton-in-Teesdale to Barnard Castle (South of the Tees)

These verges exhibited at best, a variable floristic interest. There were a small number of very good sites (three red sites were identified) but the vast majority of the verges had very low interest indeed. That said, a section of the road side verge between Lartington and Barnard Castle was of moderate value, with some interesting elements present in variable amounts. A feature of the area between Romaldkirk and Barnard Castle, was the relatively large number of 'garden escapes' found in some of the verge side grasslands and adjacent land (e.g. around Lartington).

The most interesting and diverse sites on the south side of the Tees were both quite close to Romaldkirk. One was located on the by-road between Eggleston and Romaldkirk at 'Hayberries Junction'. The other was on the south side of the road, west of Romaldkirk, close to Beer Burn. At this latter site a steep verge contained a good representative mix of grasses and herbs, including a good 'show' of meadow saxifrage, common adder's tongue fern *Ophioglossum vulgatum* and *Alchemilla monticola*. The Hayberries Junction site, which was split between three adjacent verges had 74 species of flowering plant including hoary plantain *Plantago media*, fairy flax *Linum catharticum* and three species of Lady's mantles *A. glabra*, *A. xanthochlora* and *A. filicaulis* ssp.

vestita. The rare *Alchemilla monticola* was found growing a few hundred yards away from this site (and was documented as growing nearby during the 1950s) and may yet be identified at this locality.

It is conceivable that a small number of interesting sites, most notably a possible red site on the outskirts of Romaldkirk were not identified as survey was precluded by early season, over-zealous grass-cutting.

5.3 Biodiversity Detail and Highlights

Highlights in this project area include the presence of five species of Lady's mantles including the Red Data Book species *Alchemilla acutiloba* and the nationally rare *A. monticola*. Additional biodiversity highlights include the good representation of hay meadow habitats along the B6282, in verges close to Middleton-in-Teesdale, and a small heathland at Heatherlea, along the same stretch of road, and a cluster of sites with typical hay meadows species, such as meadow saxifrage, in the Swinkley Knoll/Toft Rigg area west of Eggleston.

Locations of rare Lady's mantles outside of red sites:

- *Alchemilla acutiloba* – noted at four sites: two at Folly Top (in the area of NZ013226); one on Folly Bank (between Folly Top and Eggleston) near the lay-by (south verge) NZ009232; and, one close to the entrance track to Eggesburn Farm NY983245.
- *Alchemilla monticola* – noted at two sites: one on Folly Bank (between Folly Top and Eggleston) near the lay-by (south verge) NZ009232; and, one close to the entrance track to Eggesburn Farm NY983245.

5.3.1 Notable Species Present in the Project Area

A total of 240 species of vascular plants were recorded along the roadside verges of the project envelope (see Appendix 2 for full details).

Species identified during the survey that are of particular note for their interest, rarity and/or localised distribution include:

Common adder's-tongue (*Ophioglossum vulgatum*) – noted on one site west of Romaldkirk

Alchemilla acutiloba - a rare Lady's mantle

Alchemilla monticola - a rare Lady's mantle

Hoary plantain (*Plantago media*)

Melancholy thistle (*Cirsium heterophyllum*)

Agrimony (*Agrimonia eupatoria*)

Meadow saxifrage (*Saxifraga granulata*) – mainly scattered to the west of Eggleston on B6282

Dyer's Greenweed *Genista tinctoria* – one site west of Eggleston

Shining crane's-bill *Geranium lucidum* – growing quite widely on walls between Eggleston and Mickleton

Giant bellflower *Campanula latifolia* – growing on a small number of sites close to 'Hayberries Junction'

5.4 Summary of Red and Amber Sites

The following figures refer to the total number and length of red sites identified in the project area.

Total number of red sites: 19

Total length of red sites = 1.33 km

Total length of amber sites identified for the entire project area: 2.15 km, of which 1.43 km was classified as being 'upper amber'.

The location of all identified red and amber sites can be seen in the map section at the end of this report.

TABLE 1

LOCATIONS OF "RED SITES" IDENTIFIED DURING THE TEESDALE ROADSIDE FLORA PROJECT (MAY TO JULY 2002)

SITE NUMBER	LOCATION / SITE NAME (NUMBER OF SPECIES RECORDED)	SITE GRID REFERENCE
1	'Hayberries Junction' (Triangular site) all verges, both sides (74)	NY99452315, NY99492318, NY99552320
2	B6282 – north verge, west of gate to Burncroft Farm (55)	NY98882406 to NY98822412
3	B6282 – south verge, opposite Burncroft Farm (49)	NY98702412 to NY98882406
4*	B6282 – north verge, junction island, opp. Swinkley Knoll (24)	NY98352450 mid-point
5	B6282 – south verge, opposite Toby Hill Farm (67)	NY98202405 to NY98252447
6*	B6282 – south verge, opposite Burncroft Farm (23)	NY98802405 mid-point
7	B6282 – north verge, Toft Rigg/Swinkly Knoll (nr. new wall) (43)	NY98702420 to NY98732418
8	B6282 – north verge, Toft Rigg/Swinkly Knoll (east of farm access road) (47)	NY98502445 to NY98602432

9	B6282 – north verge, Toft Rigg (west of farm access road) (47)	NY98452447 to NY98472445
10	B6282 – north verge, disused quarry (south west of Bell Brook) (39)	NY97802470 to NY97872465
11	B6282 – north verge, Heatherlea (opp. lay-by viewpoint) (54)	NY97702480 to NY98752475
12	B6282 – north verge, Whistle Crag (72)	NY97452510 to NY97282520
13	B6282 – north verge, west of Stotley Hall junction (43)	NY 96952550 to NY96752550
14	B6282 – north verge, west of Stotley (65)	NY96982550 to NY96712545
15	B6282 – north verge, east of West Stotley (40)	NY96602555 to NY96572560
16	B6282 – north verge, west of West Stotley (40)	NY96352553 to NY96402555
17	Eggleston-Mickleton minor road (50)	NY98552313 to NY98502316
18	B6282 – north verge, Low Thatch Lea (60)	NY96252553 to NY96352555
19	B6277 – south verge, north of Beer Beck nr Romaldekirk (40)	NY99252242 to NY99322232
	Average number of species per red site: 49.05	

* Red sites 4 and 6 were both very small and consequently had a low number of species recorded, nonetheless the complement of species present, indicated that the site was of high value. Red site 5 had only a single complete site survey as a result of inappropriate grass-cutting.

At least three potential red or upper amber sites may have been missed or under-surveyed (based upon initial visual assessment) as a consequence of 'over-zealous' grass-cutting, these were located along the B6277 at central, grid references: NY99452165 and NZ00152095, and the B6278 leaving Hill Top at NY99462495.

5.5 Summary of Recorded Species Other Than Plants

5.5.1 Invertebrates

A wide range of invertebrates was recorded during the survey work. For a full species list see Appendix 4.

5.5.2 Amphibia and Reptiles

Limited information on herptiles (reptiles and amphibia) accrued as a result of the survey. A full species list of those recorded is located in Appendix 5, with specific details highlighted below.

1. Common (viviparous) lizard – two individuals were noted in a verge between Eggesburn Farm and Heatherlea.

2. Common amphibians - common frog was noted at two sites.

5.5.3 Birds

A range of typical farmland birds was noted utilising the roadsides during the survey period. These included whitethroat, linnet and yellowhammer. These were principally associating with hedgerows and scrub adjacent to grasslands habitats. Goldfinches were noted on a number of occasions using herb species within the roadside grasslands. Kestrels were observed using roadside verges for hunting. For a full species list, see Appendix 5.

5.5.4 Mammals

A number of mammal species were recorded during the survey period

1. Rabbit - numerous corpses along the road verges
2. Small mammals - a range of common species were present in most grasslands across the project area. For the full species list see Appendix 5.

PART IV - DISCUSSION AND RECOMMENDATIONS

6. Issues Affecting Roadside Verges

6.1 Introduction

The results of the survey work carried out in Teesdale, and the experience of work on the roadside verges of Weardale (2001) form the basis of the recommendations for the management of this portion of the dale's roadside verges. In order to understand why it is important to enhance them, it is necessary to appreciate why roadside verges in general are of conservation value and the threats they currently face.

With reference to the roadside verges of Teesdale in particular, the survey results demonstrate the current high botanical value of some areas (the red sites) and the potential of other areas, with appropriate management, to be of similar value (amber sites, especially those designated as upper amber). Protection and enhancement of the roadside verges in Teesdale provides an opportunity to recreate small areas of habitat that have been present for centuries and are thought to be linked to the ground flora of the dales original climax vegetation type, upland ash woodlands.

The recommendations made for managing the roadside verges in Teesdale might be achieved using a twofold approach. This involves firstly, raising public awareness of their existence and biodiversity importance and secondly, the implementation of more appropriate verge side management for the best sites.

6.2 The Relative Value of Red and Amber Sites in Teesdale and Weardale

It is worth making some comparison between the verges surveyed in Weardale in 2001 and those assessed during 2002 in Teesdale. A simple analysis of the lengths of red and amber verges identified during the respective surveys indicates that there are some considerable differences between the roadside floristic riches to be found in each of the dales. In simple terms (see the figures below) there was a much larger 'red' resource in Weardale than there was in Teesdale. This was even more evident for those verges classified as amber, with almost eight times the length of amber verge identified in Weardale, despite the total length of road verge surveyed being only just over 40% greater.

The total of red verges, expressed as a percentage of the total length of surveyed verges in Teesdale 2002 was 1.9%. 3.1% of the total length of verge surveyed in Teesdale was classified

as amber, with 2.04% of the total length being classified as Upper Amber (i.e. 66.5% of the identified 'amber resource' was classified as 'upper').

The total of red verges, expressed as a percentage of the total length of surveyed verges in Weardale 2001 was 5.45%. 17.1% of the total length of verge surveyed in Weardale was classified as amber, with 2.8% being classified as Upper Amber (i.e. 16.4% of the identified 'amber resource' was classified as 'upper').

The subjective judgement of site surveyors working on both surveys, was that the species diversity on Teesdale red sites was higher than that encountered on similar sites in Weardale during the survey work undertaken during 2001 but that, in general terms, the roadside verges in Teesdale were 'less interesting'. This is borne out by the average number of species recorded on red sites, which was 49.05 per site for red sites in Teesdale and 43.94 for red sites in Weardale.

In Teesdale, there were many fewer amber sites identified and a more limited area of high biodiversity value in roadside verges generally. Additionally, there was a greater concentration of the overall biodiversity value into small areas of the project envelope, than was the case in Weardale, with appreciable lengths of some of Teesdale's verges having very low floristic value e.g. the section of road from Barnard Castle to Folly Top.

6.3 Current Threats To Roadside Verges In Teesdale

In common with roadside verges in many areas of the UK, the verges of Teesdale together with the plant and animal life they support, face a number of threats. These can be divided into those that are due to external influences, natural processes and those which arise from current management techniques. In ecological terms, roadside verges are examples of habitats that are narrow and linear in nature and are, therefore, heavily influenced by so-called 'edge effects'. They are particularly vulnerable to the factors listed below:

- Leaching of nutrients derived from fertilisers or animal dung from adjacent farmland. This is an issue for roadside verges, which adjoin improved grassland used for livestock grazing; many such verges become dominated by nettles, thistles, docks and coarse grasses.
- Pollution from road run-off and exhaust emissions (especially NO₂, NO and SO₂). Whilst some plants are intolerant of nitrous oxides (NO, NO₂), they can be beneficial for other species. High levels of nitrogen deposition on roadside verges have been linked to the

heightened productivity of soils near the edge of the road, which can lead to the establishment of competitive grasses. Though sulphur is essential for plant growth, Sulphur dioxide (SO₂) is always detrimental to plant growth.

- The dumping of road grit and salt by the roadside, in preparation for winter conditions. Spray from the salt, once applied to the roads, or the salt itself (inappropriately stored), is toxic to many plants and can result in the establishment of halophytic plants such as oraches *Atriplex* spp., salt marsh grasses e.g. *Puccinella*, and lesser sea spurrey *Spergularia marina* – which was recorded during the current survey at its most westerly known location in the vice-county. The two metres of roadside verge nearest to the carriageway are the worst affected. Salt pollution creates bare patches, particularly close to the kerb.
- Roadside works including the installation of services such as gas, water, electricity, cable television and roadside improvements such as kerbing and widening all impact upon roadside verge habitats. Car parking and over-riding by large vehicles also physically damages roadside verges.
- The loss of floristic interest as a result of the natural progression of seral succession (i.e. scrubbing over) – a particular threat to the red site identified at Low Thatch Lea, which without intervention will be lost to ash *Fraxinus excelsior* regeneration.
- In terms of the techniques that are currently widely used to manage grass verges, there are several activities that are detrimental to roadside verge vegetation.
- The emphasis on tidiness with roadside verges being mown, in some cases, every few weeks, particularly outside roadside houses. This leads to the establishment of resilient rosette-forming species such as daisy (*Bellis perennis*).
- The use of flail mowers, which can scalp turf, dig into the soil and destroys the roots of plants.
- The build up of organic materials - grass cuttings are rarely removed. This leaves a thick layer of mulch forming a dense mat that smothers plants and increases the nutrient status of the underlying soils.

- Non-compliance with Highways Authority management strategies by contractors. Example of such non-compliance includes the cutting of excessively wide swathes and the cutting of embankments that have no implications for the safety of road users. This impacted particularly heavily on some Teesdale verges in 2002 – which had (in the most extreme example noted) up to 7 times the actual required width of grass cutting undertaken on some stretches.
- Planting of inappropriate flowering plants and tree species such as conifers, daffodils and snowdrops.
- Verges becoming strewn with fallen stones from adjacent walls and therefore left uncut.
- The unofficial adoption of herb-rich verges adjacent to or opposite farms or private dwellings, leading to their development as ‘garden extensions or lawns’.

7. The Importance of Teesdale's Roadside Verges as a Conservation Resource

7.1 A Typical Teesdale Roadside Verges - The Link to NVC Category MG3

As determined during the work in Weardale during 2001, the survey of Teesdale's roadside verges revealed the presence of a suite of frequently occurring plant species. These included wood crane's-bill *Geranium sylvaticum*, meadow crane's-bill *G. pratense*, greater burnet *Sanguisorba officinalis*, pignut *Conopodium majus*, greater plantain *Plantago major*, common sorrel *Rumex acetosa*, meadow buttercup *Ranunculus acris*, Lady's mantles *Alchemilla* agg., mouse-ear *Crex fontanum*, creeping buttercup *Ranunculus repens*, dandelion *Taraxacum officinale* agg., meadow vetchling *Lathyrus pratensis*, daisy *Bellis perennis*, cocksfoot *Dactylis glomerata*, red fescue *Festuca rubra*, Yorkshire fog *Holcus lanatus*, sweet vernal grass *Anthoxanthum odoratum*, rough meadow-grass *Poa trivialis*, crested dogs tail *Cynosurus cristatus* and smooth meadow-grass *Poa pratensis*. The plant species in the above list are all either constant or frequently occurring elements in the National Vegetation Classification (NVC) community MG3 *Anthoxanthum odoratum*-*Geranium sylvaticum* grassland i.e. a community that is characteristic of Pennine 'dales hay meadows'.

The species composition of the Teesdale roadside verges demonstrated a clear link between the roadside verges and the MG3-type hay meadows of upper Teesdale. These communities, with their characteristic tall, robust herbs are found only in the higher valleys of the Pennines and the

Lake District. Recent estimates suggest that there are less than 1000 ha of upland hay meadow (MG3) in England. The hay meadows of upper Teesdale (as evidenced by their multiple designation – SPA, NNR and ESA) are therefore of national significance as these grassland communities are not only scarce in the UK, but also Europe. They contain a large number of species as well as nationally rare/scarce plants that are often restricted to these habitats. All 'MG3' sites are of European conservation significance.

The roadside verges identified as being 'red, or 'upper amber' in the lower and mid parts of Teesdale have a constituent flora which is closely aligned to that of the 'MG3' hay meadows. If these are to be maintained, they require appropriate management. If such verges are left unmanaged, then they may be converted to the coarser *Arrhenatherum elatius* sub-community. Indeed, false oat grass (*Arrhenatherum elatius*) was recorded at many sites along Teesdale's verges and was, in places, abundant.

The recent history of Lady's mantles shows that they have declined as the amount and quality of suitable habitat has decreased. In the 1950s, *Alchemilla acutiloba* was more frequent in Weardale than in Teesdale and often occurred in meadows. Along with *A. monticola*, it was common along stretches of roadside verge in both dales. Today, its presence along roadside verges is very much reduced and in many places, there are now only isolated plants. During the last fifty years, it is estimated that numbers of *A. acutiloba* have fallen by nearly 60%. Weardale is still the main area in the country for *Alchemilla acutiloba* and now that it has become less frequent in Weardale, its more effective conservation in Teesdale is essential. Alongside this, *Alchemilla monticola* is found nowhere else in the UK, other than Teesdale and consequently its conservation in roadside verges is of paramount importance.

7.2 Key Biodiversity Issues Identified Along Roadside Verges in Teesdale

The fieldwork undertaken along the roadside verges in Teesdale enabled a number of key biodiversity issues to be identified. These are listed below. The first four issues listed below are all recognised as factors, which exert a negative influence on the Teesdale roadside verges, contributing to the very low biodiversity value of many of the verges. More positive attributes of the roadside verges are then listed, including sites, which are of botanical importance and examples of those with potential for improvement.

- Current management techniques and schedules are not always conducive to increasing the biodiversity value of roadside verges.

- Agricultural damage of roadside verges e.g. point and non-point source pollution of verges as a result of field runoff of nitrates, phosphates as well as pesticide drift from adjacent crop management works.
- Fragmentation of floristically rich roadside verge habitat.
- Very low biodiversity quality on many of the roadside verges. Of the 67 km of verges that were initially assessed, only 3.48 km were identified as being either 'red' or 'amber' (only 2,76 km being 'red' or 'upper amber').
- Significant biodiversity interest in roadside verges identified during the survey included: the verge side with five species of *Alchemilla* on the north side of the B6282, west of Stotley Hall between the junction of the minor road to Stotley Grange and the edge of the plantation woodland on the southern verge. This site recorded five species of *Alchemilla* or Lady's mantle (including *A. acutiloba* and *A. monticola*).
- The presence of melancholy thistle in considerable amounts along the B6278 between Barnard Castle and Folly Top.
- The presence of a number of *Alchemilla acutiloba* colonies along the B6278 close to Folly Top
- The verge site located on the south side of the B6277 just to the west of Romalldkirk. This location had a good representative flora, indicative of traditional hay meadows, with meadow saxifrage, adder's tongue fern and *A. monticola* all present.
- An extensive site, occurring as a suite of scattered sub-sites around 'Hayberries Junction' that boasts (at NY995231) a total of 74 species of flowering plant.
- The cluster of high quality roadside verges, on the north side of the road, between Eggesburn Farm and Middleton-in-Teesdale.
- The very real significance of roadside verges as a refuge for scarce Lady's mantles in some key zones.

- The importance of adjacent habitat features including ditches, hedgerows and stone walls. The adjacent land use was also significant – a number of the red and upper amber sites adjoined hay meadows.

8. Management Recommendations

8.1 Recommendations for the Management of Teesdale's Roadside Verges

This report makes the following recommendations with regard to conserving and subsequently enhancing the wildlife value of the roadside verges in Teesdale:

- The verges that are classified as red should be protected and maintained. This might be most effectively achieved by identifying them in appropriate fashion to the Highways Authority and contractors on maps and electronic prompts such as Geographical Information System. Those classified as upper amber should be enhanced wherever possible. Lower amber sites should be improved when resources permit.
- A time-limited, fully costed management plan applicable to all roadside verge sites identified as being of red and amber quality through appropriate survey in the North Pennines AONB and its environs, should be considered for production. This will enable the very specific, ecologically effective techniques required to successfully manage all identified red and amber sites, to be determined and implemented.
- The position of 'red' sites should be documented in paper and electronic forms (as appropriate) by the Highways Authority and where possible marked on the highway and/or the verge side to facilitate implementation of management recommendations.
- The stated policies of Durham County Council ('Policy for the Management of Roadside Verges - Environment Department, Durham County Council, 1995') should be adhered to and properly implemented. Resources currently utilised carrying out excessive and unnecessary grass cutting operations (as observed in Teesdale in 2002), which are not required under the policy, should be re-directed to the more appropriate management of 'red' and 'upper amber' sites.
- Apply appropriate grass-cutting regimes to all red sites (prescriptions for these to be drawn up after due consultation with relevant experts). The only practical method of managing

grass verges is by cutting and subsequently removing the grass cuttings. All grass cuttings should be removed within a week of cutting, to prevent the build-up of nutrients and the smothering of vegetation.

- Areas for salt storage in winter should be sited well away from red verges (as per Policy for the Management of Roadside Verges, Durham County Council, 1995).
- Remove colonising ash scrub from the roadside verge, on the north verge, at Low Thatch Lea, west of Eggleston, near Middleton Teesdale (phase I of this process was achieved by the GlaxoSmithKline Business Biodiversity Challenge Team in November 2002)
- Consider interpreting the flora of important roadside verges to the general public using appropriate mechanisms, located in accessible situations – such as an interpretive panel to be located at the Teesdale viewpoint between Eggleston and Middleton-in-Teesdale.

8.2 Potential Benefits Following Implementation of Recommendations

A suite of potential benefits would include:

- An economic saving on some of the verge management programme, especially where 'over-cutting' is currently occurring.
- Appropriate management of the roadside verges in Teesdale will prevent the establishment of undesirable species of herbs and grasses, such as nettles, docks and coarse grasses and will limit the establishment of trees and shrubs that might overshadow and eventually prevent the establishment of the majority of flowering plants.
- The number and diversity of plant species present along the roadside verges of Teesdale will increase. This will include species that are important because they are currently rare or declining.
- The visual appeal of the roadside verges will increase due to the presence of a larger number and variety of flowering plants. This will enhance the landscape for the benefit of both local communities and visitors alike.
- The area of roadside verges that constitute fragments of remnant MG3 hay meadows, a grassland type of European importance in terms of nature conservation, will be increased.

- The Teesdale roadside verges will become a 'flagship' that might be used to demonstrate to other local authorities and Highways Authorities the benefits of managing roadside verges for biodiversity.
- There will be an increase in the number of Lady's mantles growing on the roadside verges in Teesdale.
- The Highways Authority will be actively involved in implementing the Durham Biodiversity Action Plan.

PART V – APPENDICES AND DATA

The Appendices contain the broad base of biodiversity data that was collated during the project.

Appendix 1 VASCULAR PLANTS RECORDED AT RED SITES DURING THE TEESDALE ROADSIDE FLORA PROJECT (MAY - JULY 2002) – SITE RECORD CARDS

Survey Dates: 25/06/02 11/07/02	Site name: Red Site 1- Hayberries Junction – all verges	Grid Ref (Start): NY99452315, NY99552320	Grid Ref (End): NY99492318
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Notes - Red Site 1

Negative impact upon survey as a result of early, extensive and insensitive grass cutting.

Plant species	Plant species	Plant species
<i>Achillea millefolium</i>	<i>Epilobium montanum</i>	<i>P. persicaria</i>
<i>Agrostis capillaris</i>	<i>Festuca rubra</i>	<i>Potentilla anserina</i>
<i>A. stolonifera</i>	<i>Filipendula ulmaria</i>	<i>Poterium sanguisorba</i>
<i>Ajuga reptans</i>	<i>Fraxinus excelsior</i>	<i>Primula vulgaris</i>
<i>Alchemilla glabra</i>	<i>Galium cruciata</i>	<i>Quercus petraea</i>
<i>A. xanthochlora</i>	<i>G. verum</i>	<i>Ranunculus acris</i>
<i>Alliaria petiolata</i>	<i>Geranium pratense</i>	<i>Rubus idaeus</i>
<i>Alopecurus geniculatus</i>	<i>G. sylvaticum</i>	<i>Rumex acetosa</i>
<i>Anthoxanthum odoratum</i>	<i>Geum rivale</i>	<i>Sanguisorba officinalis</i>
<i>Arrhenatherum elatius</i>	<i>Heracleum sphondylium</i>	<i>Senecio jacobaea</i>
<i>Bellis perennis</i>	<i>Holcus lanatus</i>	<i>Silene dioica</i>
<i>Betonica officinalis</i>	<i>Lamium album</i>	<i>Spergularia media</i>
<i>Briza media</i>	<i>Lathyrus pratensis</i>	<i>Stellaria graminea</i>
<i>Centaurea nigra</i>	<i>Leontodon hispidus</i>	<i>S. holostea</i>
<i>Cerastium holosteoides</i>	<i>Linum catharticum</i>	<i>Taraxacum officinale</i> agg.
<i>Chenopodium album</i>	<i>Lotus corniculatus</i>	<i>Torilis japonica</i>
<i>Chrysanthemum leucanthemum</i>	<i>Luzula campestris</i>	<i>Trifolium medium</i>
<i>Cirsium arvense</i>	<i>Medicago lupulina</i>	<i>T. pratense</i>
<i>C. vulgare</i>	<i>Mercurialis perennis</i>	<i>T. repens</i>
<i>Conopodium majus</i>	<i>Pilosella officinarum</i>	<i>Urtica dioica</i>
<i>Crataegus monogyna</i>	<i>Plantago lanceolata</i>	<i>Veronica chamaedrys</i>
<i>Cynosaurus cristatus</i>	<i>Plantago major</i>	<i>Vicia sepium</i>
<i>Dactylis glomerata</i>	<i>Poa annua</i>	<i>Viola odorata</i>
<i>Dactylorhiza fuchsii</i>	<i>P. trivialis</i>	<i>V. riviniana</i>
<i>Deschampsia caespitosa</i>	<i>Polygonum aviculare</i>	

Survey Dates: 13/06/02 02/07/02	Site name: Red Site 2 - Burncroft Farm – north verge, west of gate	Grid Ref (Start): NY 98882406	Grid Ref (End): NY 98822412
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Notes - Red Site 2

Negative impact upon survey as a result of early, extensive and insensitive grass cutting.

Plant species	Plant species
<i>Acer pseudoplatanus</i>	<i>Luzula campestris</i>
<i>Achillea millefolium</i>	<i>Matricaria matricarioides</i>
<i>Alchemilla filicaulis</i> Ssp. <i>vestita</i>	<i>Medicago lupulina</i>
<i>A. glabra</i>	<i>Mercurialis perennis</i>
<i>A. monticola</i>	<i>Myosotis caespitosa</i>
<i>A. xanthochlora</i>	<i>Pilosella officinarum</i>
<i>Anthoxanthum odoratum</i>	<i>Plantago lanceolata</i>

<i>Arrhenatherum elatius</i>	<i>Polygonum aviculare</i>
<i>Arum maculatum</i>	<i>P. persicaria</i>
<i>Cardamine amara</i>	<i>Potentilla sterilis</i>
<i>Chenopodium album</i>	<i>Prunus spinosa</i>
<i>Chrysanthemum leucanthemum</i>	<i>Ranunculus acris</i>
<i>Cirsium arvense</i>	<i>Rosa</i> spp.
<i>C. vulgare</i>	<i>Rubus idaeus</i>
<i>Conopodium majus</i>	<i>Saxifraga granulata</i>
<i>Crataegus monogyna</i>	<i>Senecio jacobaea</i>
<i>Festuca rubra</i>	<i>Sisymbrium orientale</i>
<i>Fraxinus excelsior</i>	<i>Stellaria media</i>
<i>Galium aparine</i>	<i>Taraxacum officinale</i> agg.
<i>G. cruciata</i>	<i>Torilis japonica</i>
<i>Fraxinus excelsior</i>	<i>Trifolium medium</i>
<i>Galium aparine</i>	<i>T. pratense</i>
<i>G. cruciata</i>	<i>T. repens</i>
<i>Geum urbanum</i>	<i>Trisetum flavescens</i>
<i>Heracleum sphondylium</i>	<i>Urtica dioica</i>
<i>Hieracium</i> spp.	<i>Veronica chamaedrys</i>
<i>Holcus lanatus</i>	<i>Vicia sepium</i>
<i>Lathyrus pratensis</i>	

Survey Dates: 13/06/02 02/07/02	Site name – Opp. Bu nr. retainin verge	Notes - Red Site 3 Negative impact upon survey as a result of early, extensive and insensitive grass cutting.	Grid Ref (Start): NY98702412	Grid Ref (End): NY98882406
Plant species			Plant species	
<i>Achillea millefolium</i>			<i>Geranium sylvaticum</i>	
<i>Alchemilla acutiloba</i>			<i>Heracleum sphondylium</i>	
<i>A. filicaulis</i> Ssp. <i>vestita</i>			<i>Lamium album</i>	
<i>A. glabra</i>			<i>Lathyrus pratensis</i>	
<i>A. monticola</i>			<i>Myosotis caespitose</i>	
<i>A. xanthochlora</i>			<i>Pilosella officinarum</i>	
<i>Alliaria petiolata</i>			<i>Plantago lanceolata</i>	
<i>Anthoxanthum odoratum</i>			<i>Polygonum aviculare</i>	
<i>Anthriscus sylvestris</i>			<i>P. persicaria</i>	
<i>Arrhenatherum elatius</i>			<i>Potentilla sterilis</i>	
<i>Calystegia sepium</i>			<i>Poterium sanguisorba</i>	
<i>Campanula rotundifolia</i>			<i>Ranunculus acris</i>	
<i>Centaurea nigra</i>			<i>R. repens</i>	
<i>Chenopodium album</i>			<i>Rosa</i> spp.	
<i>Chrysanthemum leucanthemum</i>			<i>Rumex acetosa</i>	
<i>Cirsium arvense</i>			<i>Saxifraga granulata</i>	
<i>Conopodium majus</i>			<i>Senecio jacobaea</i>	
<i>Crataegus monogyna</i>			<i>Sisymbrium orientale</i>	
<i>Dactylis glomerata</i>			<i>Taraxacum officinale</i> agg.	
<i>Festuca rubra</i>			<i>Tilia x europaea</i>	
<i>Filipendula ulmaria</i>			<i>Trifolium pratense</i>	
<i>Fraxinus excelsior</i>			<i>T. repens</i>	
<i>Galium aparine</i>			<i>Veronica chamaedrys</i>	
<i>G. cruciata</i>			<i>Vicia sativa</i>	
<i>G. verum</i>				

Survey Dates: 30/05/02 02/07/02	Site name: – Road junction opposite junction	Notes - Red Site 4 <i>Alchemilla monticola</i> was recorded at this location by M. Bradshaw in 2000. This is a very small site, on a traffic island, and road traffic management and safety considerations might mitigate against it being managed for its floristic interest.	Grid Ref (Start): NY98352450 mid-point	Grid Ref (End): Not relevant
Plant species			Plant species	
<i>Achillea millefolium</i>			<i>Plantago lanceolata</i>	
<i>Alchemilla glabra</i>			<i>Plantago major</i>	
<i>A. xanthochlora</i>			<i>Polygonum aviculare</i>	
<i>Anthoxanthum odoratum</i>			<i>P. persicaria</i>	
<i>Bellis perennis</i>			<i>Potentilla reptans</i>	
<i>Chrysanthemum leucanthemum</i>			<i>Ranunculus acris</i>	
<i>Conopodium majus</i>			<i>R. bulbosus</i>	
<i>Festuca rubra</i>			<i>Rumex acetosa</i>	
<i>Geranium pratense</i>			<i>R. obtusifolius</i>	
<i>Heracleum sphondylium</i>			<i>Senecio jacobaea</i>	
<i>Luzula campestris</i>			<i>Trifolium repens</i>	
<i>Matricaria matricarioides</i>			<i>Vicia cracca</i>	

Survey Dates: 17/05/02 02/07/02 (partial)	Site name: Red Site 5 – Toby Hill Farm entrance, south verge	Grid Ref (Start): NY98202405	Grid Ref (End): NY98252447
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Meconopsis cambrica</i>
<i>Aegopodium podagraria</i>	<i>Medicago lupulina</i>
<i>Alchemilla acutiloba</i>	<i>Mercurialis perennis</i>
<i>A. filicaulis</i> Ssp. <i>vestita</i>	<i>Myosotis caespitosa</i>
<i>A. glabra</i>	<i>Narcissus</i> spp.
<i>A. xanthochlora</i>	<i>Plantago lanceolata</i>
<i>Alopecurus geniculatus</i>	<i>P. major</i>
<i>A. pratensis</i>	<i>Polygonum aviculare</i>
<i>Anthriscus sylvestris</i>	<i>P. persicaria</i>
<i>Arrhenatherum elatius</i>	<i>Ranunculus acris</i>
<i>Bellis perennis</i>	<i>R. bulbosus</i>
<i>Cardamine pratensis</i>	<i>R. ficaria</i>
<i>C. hirsuta</i>	<i>R. repens</i>
<i>Carex flacca</i>	<i>Rosa</i> spp.
<i>Cerastium holosteoides</i>	<i>Rubus idaeus</i>
<i>Cirsium arvense</i>	<i>Rubus</i> spp.
<i>Conopodium majus</i>	<i>Rumex acetosa</i>
<i>Cruciata laevipes</i>	<i>R. acetosella</i>
<i>Cynosaurus cristatus</i>	<i>Senecio jacobaea</i>
<i>Dactylis glomerata</i>	<i>S. vulgaris</i>
<i>Dryopteris dilatata</i>	<i>Stachys officinalis</i>
<i>Equisetum arvense</i>	<i>Stellaria holostea</i>
<i>Festuca ovina</i>	<i>Syringa vulgaris</i>
<i>F. rubra</i>	<i>Taraxacum officinale</i> agg.
<i>Fraxinus excelsior</i>	<i>Tragopogon pratensis</i>
<i>Galium aparine</i>	<i>Trifolium dubium</i>
<i>G. cruciata</i>	<i>T. pratense</i>
<i>Geranium pratense</i>	<i>T. repens</i>
<i>Geum rivale</i>	<i>Tussilago farfara</i>
<i>Heracleum sphondylium</i>	<i>Urtica dioica</i>
<i>Hyacinthoides non-scripta</i>	<i>Veronica chamaedrys</i>
<i>Lathyrus pratensis</i>	<i>Vicia sepium</i>
<i>Luzula campestris</i>	<i>Viola riviniana</i>
<i>Matricaria matricarioides</i>	

Notes - Red Site 5

Alchemilla acutiloba and *Alchemilla monticola* have both been previously recorded adjacent to this site – along the farm track (c. 10 m distance).

Basal leaves, which may have been referable to *A. monticola* were noted on site in late autumn 2002 – but further survey work is required to confirm its presence.

As a result of very early, extensive and insensitive grass cutting this verge was only fully surveyed on one occasion.

Survey Dates: 13/06/02 02/07/02	Notes - Red Site 6 Very small site near to stile on public footpath	Grid Ref (Start): NY98802405 mid-point	Grid Ref (End):
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Myosotis caespitosa</i>
<i>Alchemilla glabra</i>	<i>Plantago major</i>
<i>A. xanthochlora</i>	<i>Poa annua</i>
<i>Arrhenatherum elatius</i>	<i>Polygonum aviculare</i>
<i>Centaurea nigra</i>	<i>Rhinanthus minor</i>
<i>Chenopodium album</i>	<i>Sanguisorba officinalis</i>
<i>Cirsium arvense</i>	<i>Saxifraga granulata</i>
<i>Conopodium majus</i>	<i>Senecio jacobaea</i>
<i>Galium aparine</i>	<i>Taraxacum officinale</i> agg.
<i>Geranium sylvaticum</i>	<i>Trifolium pratense</i>
<i>Heracleum sphondylium</i>	<i>Veronica chamaedrys</i>
<i>Holcus lanatus</i>	<i>Vicia cracca</i>

Survey Dates: 13/06/02 09/07/02	Site name: Red Site 7 – Toft Rigg & Swinkley Knoll, north verge	Grid Ref (Start): NY98702420	Grid Ref (End): NY98732418
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Geum rivale</i>
<i>Alopecurus geniculatus</i>	<i>G. urbanum</i>
<i>A. pratensis</i>	<i>Hieracium</i> spp.
<i>Anthoxanthum odoratum</i>	<i>Heracleum sphondylium</i>
<i>Anthriscus sylvestris</i>	<i>Holcus lanatus</i>
<i>Arrhenatherum elatius</i>	<i>Ilex aquifolium</i>
<i>Carex hirta</i>	<i>Lathyrus pratensis</i>
<i>Centaurea nigra</i>	<i>Luzula campestris</i>
<i>Chenopodium bonus-henricus</i>	<i>Plantago lanceolata</i>
<i>Cirsium arvense</i>	<i>Ranunculus acris</i>
<i>Conopodium majus</i>	<i>R. ficaria</i>
<i>Corylus avellana</i>	<i>Rumex acetosa</i>
<i>Cynosaurus cristatus</i>	<i>Saxifraga granulata</i>
<i>Dactylis glomerata</i>	<i>Stellaria holostea</i>
<i>Equisetum arvense</i>	<i>Taraxacum officinale</i> agg.
<i>Festuca rubra</i>	<i>Trifolium pratense</i>
<i>Filipendula ulmaria</i>	<i>T. repens</i>
<i>Fraxinus excelsior</i>	<i>Urtica dioica</i>
<i>Galium aparine</i>	<i>Veronica chamaedrys</i>
<i>G. cruciata</i>	<i>Vicia sativa</i>
<i>Geranium pratense</i>	<i>Viola riviniana</i>
<i>G. sylvaticum</i>	

Survey Dates: 13/06/02 09/07/02	Site name: Red Site 8 – Between Toft Rigg & Swinkley Knoll, north verge, east of farm access	Grid Ref (Start): NY98502445	Grid Ref (End): NY98602432
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Mercurialis perennis</i>
<i>Aegopodium podagraria</i>	<i>Myosotis caespitosa</i>
<i>Alchemilla glabra</i>	<i>Plantago lanceolata</i>
<i>Alliaria petiolata</i>	<i>Plantago major</i>
<i>Alopecurus geniculatus</i>	<i>Poa trivialis</i>

<i>Anthriscus sylvestris</i>	<i>Primula vulgaris</i>
<i>Arrhenatherum elatius</i>	<i>Ranunculus acris</i>
<i>Bellis perennis</i>	<i>R. ficaria</i>
<i>Chrysanthemum leucanthemum</i>	<i>Rheum</i> spp.
<i>Cirsium heterophyllum</i>	<i>Rosa</i> spp.
<i>C. vulgare</i>	<i>Rubus</i> spp.
<i>Conopodium majus</i>	<i>Rumex obtusifolius</i>
<i>Crataegus monogyna</i>	<i>Senecio jacobaea</i>
<i>Dactylis glomerata</i>	<i>Stachys sylvatica</i>
<i>Equisetum arvense</i>	<i>Stellaria graminea</i>
<i>Festuca rubra</i>	<i>S. holostea</i>
<i>Filipendula ulmaria</i>	<i>Taraxacum officinale</i> agg.
<i>Galium aparine</i>	<i>Tilia europaea</i>
<i>G. cruciata</i>	<i>Trifolium pratense</i>
<i>Geranium robertianum</i>	<i>Urtica dioica</i>
<i>G. sylvaticum</i>	<i>Veronica chamaedrys</i>
<i>Heracleum sphondylium</i>	<i>Vicia cracca</i>
<i>Lapsana communis</i>	<i>V. sepium</i>
<i>Lathyrus pratensis</i>	

Survey Dates: 13/06/02 09/07/02	Site name: Red Site 9 – Farm access, both sides (E & W)	Grid Ref (Start): NY98452447	Grid Ref (End): NY98472445
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Notes - Red Site 9

Area of floristic interest probably considerably reduced by 'lawn' management of verge by farm access.

Plant species	Plant species
<i>Achillea millefolium</i>	<i>Plantago lanceolata</i>
<i>Alchemilla xanthochlora</i>	<i>Plantago major</i>
<i>Anthoxanthum odoratum</i>	<i>Poa trivialis</i>
<i>Anthriscus sylvestris</i>	<i>Potentilla sterilis</i>
<i>Arrhenatherum elatius</i>	<i>Ranunculus acris</i>
<i>Bellis perennis</i>	<i>R. bulbosus</i>
<i>Centaurea nigra</i>	<i>R. ficaria</i>
<i>Chrysanthemum leucanthemum</i>	<i>Rhinanthus minor</i>
<i>Conopodium majus</i>	<i>Rubus</i> spp.
<i>Cynosaurus cristatus</i>	<i>Rumex acetosa</i>
<i>Dactylis glomerata</i>	<i>Saxifraga granulata</i>
<i>Equisetum arvense</i>	<i>Senecio jacobaea</i>
<i>Festuca rubra</i>	<i>Stellaria graminea</i>
<i>Filipendula ulmaria</i>	<i>S. media</i>
<i>Galium cruciata</i>	<i>Taraxacum officinale</i> agg.
<i>Heracleum sphondylium</i>	<i>Trifolium dubium</i>
<i>Holcus lanatus</i>	<i>T. pratense</i>
<i>Lathyrus pratensis</i>	<i>Urtica dioica</i>
<i>Lotus corniculatus</i>	<i>Veronica chamaedrys</i>
<i>Luzula campestris</i>	<i>Vicia sativa</i>
<i>Myosotis discolor</i>	<i>V. sepium</i>
<i>M. scorpioides</i>	

Survey Dates: 13/06/02 09/07/02	Site name: Red Site 10 - Disused quarry – north verge of Ornella Farm	Grid Ref (Start): NY 97802470	Grid Ref (End): NY 97872465
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Lotus corniculatus</i>
<i>Anthoxanthum odoratum</i>	<i>Luzula campestris</i>

<i>Arrhenatherum elatius</i>	<i>Molinia caerulea</i>
<i>Briza media</i>	<i>Pilosella officinarum</i>
<i>Calluna vulgaris</i>	<i>Plantago lanceolata</i>
<i>Campanula rotundifolia</i>	<i>P. major</i>
<i>Centaurea nigra</i>	<i>Potentilla erecta</i>
<i>Chamaenerion augustifolium</i>	<i>Rubus</i> spp.
<i>Cirsium arvense</i>	<i>Rumex acetosa</i>
<i>Conopodium majus</i>	<i>R. acetosella</i>
<i>Dactylis glomerata</i>	<i>Senecio jacobaea</i>
<i>Deschampsia caespitosa</i>	<i>Stellaria graminea</i>
<i>Festuca ovina</i>	<i>Thymus praecox</i>
<i>F. rubra</i>	<i>Trifolium pratense</i>
<i>Galium saxatile</i>	<i>T. repens</i>
<i>G. verum</i>	<i>Vaccinium myrtillus</i>
<i>Hieracium</i> spp.	<i>Veronica chamaedrys</i>
<i>Hypochoeris radicata</i>	<i>Vicia sativa</i>
<i>Lathyrus montanus</i>	<i>Viola riviniana</i>
<i>Linum catharticum</i>	

Survey Dates: 20/06/02 09/07/02	Site name: Red Site 11 - Heatherlea – opp. view point car park, north verge	Grid Ref (Start): NY97702480	Grid Ref (End): NY98752475
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Lathyrus pratensis</i>
<i>Alchemilla monticola</i>	<i>Lotus corniculatus</i>
<i>A. xanthochlora</i>	<i>Luzula campestris</i>
<i>Anthoxanthum odoratum</i>	<i>Molinia caerulea</i>
<i>Anthriscus sylvestris</i>	<i>Pilosella officinarum</i>
<i>Arrhenatherum elatius</i>	<i>Plantago lanceolata</i>
<i>Bellis perennis</i>	<i>Poa pratensis</i>
<i>Briza media</i>	<i>Potentilla erecta</i>
<i>Calluna vulgaris</i>	<i>Rosa</i> spp.
<i>Cardamine pratensis</i>	<i>Rubus</i> spp.
<i>Centaurea nigra</i>	<i>Rumex acetosa</i>
<i>Chaerophyllum temulentum</i>	<i>R. acetosella</i>
<i>Chrysanthemum leucanthemum</i>	<i>Senecio jacobaea</i>
<i>Cirsium vulgare</i>	<i>Sonchus asper</i>
<i>Conopodium majus</i>	<i>S. arvensis</i>
<i>Cynosaurus cristatus</i>	<i>Stellaria media</i>
<i>Dactylis glomerata</i>	<i>Taraxacum officinale</i> agg.
<i>Festuca ovina</i>	<i>Teucrium scorodonia</i>
<i>F. rubra</i>	<i>Thymus</i> spp.
<i>Galium aparine</i>	<i>Trifolium pratense</i>
<i>G. cruciata</i>	<i>Trisetum flavescens</i>
<i>G. saxatile</i>	<i>Urtica dioica</i>
<i>G. verum</i>	<i>Vaccinium myrtillus</i>
<i>Heracleum sphondylium</i>	<i>Veronica chamaedrys</i>
<i>Hieracium</i> spp.	<i>Vicia sepium</i>
<i>Hypochoeris radicata</i>	

Survey Dates: 20/06/02 09/07/02	Site name: 12 – W north v	Notes - Red Site 12 Herb-rich site on an outcrop of sandstone, rising to some 4 m in height.	Grid Ref (Start): NY97452510	Grid Ref (End): NY97282520
Plant species			Plant species	
<i>Acer pseudoplatanus</i>			<i>Potentilla erecta</i>	
<i>Achillea millefolium</i>	<i>D. dilatata</i>		<i>P. sterilis</i>	
<i>Agrimonia eupatoria</i>	<i>D. filix-mas</i>		<i>Rosa</i> spp.	
<i>Alchemilla monticola</i>	<i>Festuca ovina</i>		<i>Rumex acetosa</i>	
<i>A. xanthochlora</i>	<i>Filipendula ulmaria</i>		<i>Sambucus nigra</i>	
<i>Alliaria petiolata</i>	<i>Fragaria vesca</i>		<i>Sedum reflexum</i>	
<i>Alopecurus geniculatus</i>	<i>Fraxinus excelsior</i>		<i>Senecio jacobaea</i>	
<i>Anthoxanthum odoratum</i>	<i>Galium aparine</i>		<i>Sonchus arvensis</i>	
<i>Anthriscus sylvestris</i>	<i>G. cruciata</i>		<i>S. asper</i>	
<i>Armeria maritima</i>	<i>G. verum</i>		<i>Stellaria graminea</i>	
<i>Arrhenatherum elatius</i>	<i>Geranium sylvaticum</i>		<i>S. holostea</i>	
<i>Betonica officinalis</i>	<i>Heracleum sphondylium</i>		<i>S. media</i>	
<i>Campanula rotundifolia</i>	<i>Hieracium perpropinquum</i>		<i>S. nemorum</i>	
<i>Centaurea nigra</i>	<i>Lathyrus pratensis</i>		<i>Taraxacum officinale</i> agg.	
<i>Chamaenerion augustifolium</i>	<i>Lotus corniculatus</i>		<i>Teucrium scorodonia</i>	
<i>Chenopodium album</i>	<i>Meconopsis cambrica</i>		<i>Thymus drucei</i>	
<i>Cirsium arvense</i>	<i>Molinia caerulea</i>		<i>Torilis japonica</i>	
<i>C. vulgare</i>	<i>Myosotis caespitosa</i>		<i>Trifolium pratense</i>	
<i>Cotoneaster horizontalis</i>	<i>Pentaglottis sempervirens</i>		<i>Tussilago farfara</i>	
<i>Crataegus monogyna</i>	<i>Pilosella officinarum</i>		<i>Urtica dioica</i>	
<i>Cynosaurus cristatus</i>	<i>Plantago lanceolata</i>		<i>Veronica chamaedrys</i>	
<i>Dactylis glomerata</i>	<i>P. major</i>		<i>Vicia cracca</i>	
<i>Digitalis purpurea</i>	<i>Poa pratensis</i>		<i>V. sativa</i>	
<i>Dryopteris cambrensis</i>	<i>P. trivialis</i>		<i>V. sepium</i>	

Survey Dates: 20/06/02 09/07/02	Site name: Red Site 13 – East of Stotley Hall, north verge	Grid Ref (Start): NY 96952550	Grid Ref (End): NY 97282520
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>G. robertianum</i>
<i>Aegopodium podagraria</i>	<i>Geum rivale</i>
<i>Alchemilla glabra</i>	<i>Heracleum sphondylium</i>
<i>A. monticola</i>	<i>Holcus lanatus</i>
<i>A. xanthochlora</i>	<i>Juncus</i> spp.
<i>Anthoxanthum odoratum</i>	<i>Knautia arvensis</i>
<i>Anthriscus sylvestris</i>	<i>Plantago lanceolata</i>
<i>Arrhenatherum elatius</i>	<i>P. major</i>
<i>Bellis perennis</i>	<i>Potentilla anserine</i>
<i>Cardamine pratensis</i>	<i>Ranunculus acris</i>
<i>Centaurea nigra</i>	<i>R. repens</i>
<i>Cerastium holosteoides</i>	<i>Rosa arvensis</i>
<i>Cirsium arvense</i>	<i>Rubus</i> spp.
<i>Conopodium majus</i>	<i>Rumex acetosa</i>
<i>Cynosaurus cristatus</i>	<i>Sambucus nigra</i>
<i>Dactylis glomerata</i>	<i>Senecio jacobaea</i>
<i>Festuca rubra</i>	<i>Taraxacum officinale</i> agg.
<i>Filipendula ulmaria</i>	<i>Trifolium repens</i>
<i>Fraxinus excelsior</i>	<i>Tussilago farfara</i>
<i>Galium aparine</i>	<i>Veronica chamaedrys</i>

<i>G. cruciata</i>	<i>Vicia sepium</i>
<i>Geranium pratense</i>	

Survey Dates: 20/06/02 09/07/02	Site name: Red Site 14 – West of Stotley, north verge (east of metalled road)	Grid Ref (Start): NY 96982550	Grid Ref (End): NY 96712545
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Plant species	Plant species
<i>Acer pseudoplatanus</i>	<i>Heracleum sphondylium</i>
<i>Achillea millefolium</i>	<i>Hesperis matronalis</i>
<i>Aegopodium podagraria</i>	<i>Hieracium perpropinquum</i>
<i>Agrimonia eupatoria</i>	<i>Hypochoeris radicata</i>
<i>Alchemilla acutiloba</i>	<i>Leontodon hispidus</i>
<i>A. filicaulis</i> Ssp. <i>vestita</i>	<i>Linum catharticum</i>
<i>A. glabra</i>	<i>Lotus corniculatus</i>
<i>A. monticola</i>	<i>Plantago lanceolata</i>
<i>A. xanthochlora</i>	<i>Potentilla anserina</i>
<i>Alopecurus geniculatus</i>	<i>P. erecta</i>
<i>Anthriscus sylvestris</i>	<i>P. sterilis</i>
<i>Arrhenatherum elatius</i>	<i>Primula veris</i>
<i>Bellis perennis</i>	<i>Ranunculus acris</i>
<i>Betonica officinalis</i>	<i>R. repens</i>
<i>Caramine pratensis</i>	<i>Rosa</i> spp.
<i>Centaurea nigra</i>	<i>Rubus</i> spp.
<i>Cerastium holosteoides</i>	<i>Rumex acetosa</i>
<i>Cirsium arvense</i>	<i>R. acetosella</i>
<i>C. vulgare</i>	<i>Senecio jacobaea</i>
<i>Conopodium majus</i>	<i>Sonchus arvensis</i>
<i>Crataegus monogyna</i>	<i>Stellaria graminea</i>
<i>Dactylis glomerata</i>	<i>S. holostea</i>
<i>Deschampsia caespitosa</i>	<i>S. media</i>
<i>Dryopteris affinis</i> ssp. <i>cambrensis</i>	<i>Taraxacum officinale</i> agg.
<i>Equisetum arvense</i>	<i>Tragopogon pratensis</i>
<i>Festuca rubra</i>	<i>Trifolium pratense</i>
<i>Filipendula ulmaria</i>	<i>T. repens</i>
<i>Galium aparine</i>	<i>Trisetum flavescens</i>
<i>G. cruciata</i>	<i>Tussilago farfara</i>
<i>G. verum</i>	<i>Urtica dioica</i>
<i>Geranium pratense</i>	<i>Veronica chamaedrys</i>
<i>G. robertianum</i>	<i>Vicia sepium</i>
<i>Geum rivale</i>	

Survey Dates: 20/06/02 09/07/02	Site name: Red Site 15 – East of West Stotley – north verge	Grid Ref (Start): NY96602555	Grid Ref (End): NY96572560
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>Lathyrus pratensis</i>
<i>Ajuga reptans</i>	<i>Leontodon hispidus</i>
<i>Alchemilla glabra</i>	<i>Linum catharticum</i>
<i>A. xanthochlora</i>	<i>Lotus corniculatus</i>
<i>Bellis perennis</i>	<i>Luzula campestris</i>
<i>Carex flacca</i>	<i>Medicago lupulina</i>
<i>Centaurea nigra</i>	<i>Plantago lanceolata</i>
<i>Cerastium holosteoides</i>	<i>Prunella vulgaris</i>

<i>Chrysanthemum leucanthemum</i>	<i>Ranunculus acris</i>
<i>Cirsium arvense</i>	<i>Rumex acetosa</i>
<i>Conopodium majus</i>	<i>R. obtusifolius</i>
<i>Cynosaurus cristatus</i>	<i>Senecio jacobaea</i>
<i>Dactylis glomerata</i>	<i>Stellaria media</i>
<i>Deschampsia caespitosa</i>	<i>Taraxacum officinale</i> agg.
<i>Equisetum arvense</i>	<i>Tragopogon pratensis</i>
<i>Filipendula ulmaria</i>	<i>Trifolium medium</i>
<i>Galium aparine</i>	<i>T. repens</i>
<i>Heracleum sphondylium</i>	<i>Veronica chamaedrys</i>
<i>Hypericum</i> spp.	<i>Vicia sativa</i>
<i>Holcus lanatus</i>	<i>V. sepium</i>

Survey Dates: 20/06/02 09/07/02	Site name: Red Site16 – west of West Stotley – north verge (east of metalled road)	Grid Ref (Start): NY 96352553	Grid Ref (End): NY 96402555
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Plant species	Plant species
<i>Alchemilla filicaulis</i> Ssp. <i>vestita</i>	<i>Hypericum perforatum</i>
<i>A. glabra</i>	<i>Juncus conglomeratus</i>
<i>A. monticola</i>	<i>J. inflexus</i>
<i>A. xanthochlora</i>	<i>Lapsana communis</i>
<i>Anthoxanthum odoratum</i>	<i>Lathyrus montanus</i>
<i>Anthriscus sylvestris</i>	<i>Linum catharticum</i>
<i>Bellis perennis</i>	<i>Medicago lupulina</i>
<i>Cardamine pratensis</i>	<i>Myosotis caespitosa</i>
<i>Carex flacca</i>	<i>Plantago lanceolata</i>
<i>C. nigra</i>	<i>Poa trivialis</i>
<i>Centaurea nigra</i>	<i>Potentilla sterilis</i>
<i>Cerastium holosteoides</i>	<i>Prunella vulgaris</i>
<i>Chrysanthemum leucanthemum</i>	<i>Ranunculus acris</i>
<i>Cirsium vulgare</i>	<i>Rhinanthus minor</i>
<i>Cynosaurus cristatus</i>	<i>Rumex crispus</i>
<i>Deschampsia caespitosa</i>	<i>Senecio jacobaea</i>
<i>Festuca rubra</i>	<i>Trifolium dubium</i>
<i>Geum rivale</i>	<i>T. repens</i>
<i>Heracleum sphondylium</i>	<i>Vicia cracca</i>
<i>Holcus lanatus</i>	<i>V. sepium</i>

Survey Dates: 27/06/02 11/07/02	Site name: Red Site 17 – near 'west' end, Eggleston-Mickleton Rd, south verge	Grid Ref (Start): NY 98552313	Grid Ref (End): NY 98502316
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Plant species	Plant species
<i>Achillea millefolium</i>	<i>G. urbanum</i>
<i>Agropyron repens</i>	<i>Heracleum sphondylium</i>
<i>Alchemilla glabra</i>	<i>Lotus corniculatus</i>
<i>A. xanthochlora</i>	<i>Mercurialis perennis</i>
<i>Alliaria petiolata</i>	<i>Plantago lanceolata</i>
<i>Anthriscus sylvestris</i>	<i>P. media</i>
<i>Arrhenatherum elatius</i>	<i>Poa trivialis</i>
<i>Arum maculatum</i>	<i>Polygonum aviculare</i>
<i>Betonica officinalis</i>	<i>P. persicaria</i>
<i>Briza media</i>	<i>Potentilla sterilis</i>
<i>Carex flacca</i>	<i>Primula veris</i>

<i>Chenopodium album</i>	<i>Prunus spinosa</i>
<i>Cirsium arvense</i>	<i>Ranunculus acris</i>
<i>Conopodium majus</i>	<i>Ribes uva-crispa</i>
<i>Crataegus monogyna</i>	<i>Rosa</i> spp.
<i>Dactylis glomerata</i>	<i>Rubus</i> spp.
<i>Dryopteris filix-mas</i>	<i>Rumex acetosa</i>
<i>Festuca ovina</i>	<i>R. crispus</i>
<i>F. rubra</i>	<i>Taraxacum officinale</i> agg.
<i>Filipendula ulmaria</i>	<i>Tragopogon pratensis</i>
<i>Galium aparine</i>	<i>Urtica dioica</i>
<i>G. cruciata</i>	<i>Valeriana officinalis</i>
<i>Geranium robertianum</i>	<i>Veronica chamaedrys</i>
<i>G. sylvaticum</i>	<i>Vicia sepium</i>
<i>Geum rivale</i>	<i>Viola riviniana</i>

Survey Dates: 17/05/02 09/07/02	Site name: Red Site 18 – Low Thatch Lea, north verge	Grid Ref (Start): NY 96352555	Grid Ref (End): NY 96252553
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Plant species	Plant species
<i>Acer pseudoplatanus</i>	<i>Geranium robertianum</i>
<i>Achillea millefolium</i>	<i>Geum rivale</i>
<i>Aegopodium podagraria</i>	<i>Heracleum sphondylium</i>
<i>Ajuga reptans</i>	<i>Juncus conglomeratus</i>
<i>Alchemilla acutiloba</i>	<i>Lathyrus pratensis</i>
<i>A. glabra</i>	<i>Linum catharticum</i>
<i>A. xanthochlora</i>	<i>Lotus corniculatus</i>
<i>Anthriscus sylvestris</i>	<i>Myosotis caespitosa</i>
<i>Bellis perennis</i>	<i>M. discolor</i>
<i>Cardamine pratensis</i>	<i>Plantago lanceolata</i>
<i>Carex flacca</i>	<i>Potentilla reptans</i>
<i>C. ovalis</i>	<i>Primula veris</i>
<i>Centaurea nigra</i>	<i>Prunella vulgaris</i>
<i>Cerastium holosteoides</i>	<i>Ranunculus acris</i>
<i>Chrysanthemum leucanthemum</i>	<i>R. ficaria</i>
<i>Cirsium arvense</i>	<i>R. repens</i>
<i>C. vulgare</i>	<i>Rosa</i> spp.
<i>Conopodium majus</i>	<i>Rubus</i> spp.
<i>Crataegus monogyna</i>	<i>Rumex acetosa</i>
<i>Dactylis glomerata</i>	<i>R. acetosella</i>
<i>Dactylorhiza purpurella</i>	<i>R. obtusifolius</i>
<i>Deschampsia caespitosa</i>	<i>Sanguisorba officinalis</i>
<i>Epilobium montanum</i>	<i>Senecio jacobaea</i>
<i>Equisetum arvense</i>	<i>Taraxacum officinale</i> agg.
<i>Fagus sylvatica</i>	<i>Trifolium pratense</i>
<i>Festuca rubra</i>	<i>T. repens</i>
<i>Filipendula ulmaria</i>	<i>Tussilago farfara</i>
<i>Fraxinus excelsior</i>	<i>Urtica dioica</i>
<i>Galium cruciata</i>	<i>Veronica chamaedrys</i>
<i>Galium aparine</i>	<i>Vicia cracca</i>

Survey Dates: 30/05/02 27/06/02	Site name: 19 – nr. north of south ve	Notes - Red Site 19 <i>Alchemilla monticola</i> was noted in this area during the 1950s and has persisted to the present day.	Grid Ref (Start): NY 99252242	Grid Ref (End): NY 9932232
Plant species			Plant species	
<i>Aegopodium podagraria</i>			<i>Geracleum sphondylium</i>	
<i>Alchemilla glabra</i>			<i>Volcus lanatus</i>	
<i>A. monticola</i>			<i>Luzula campestris</i>	
<i>A. xanthochlora</i>			<i>Mercurialis perennis</i>	
<i>Alliaria petiolata</i>			<i>Myosotis stolonifera</i>	
<i>Anthoxanthum odoratum</i>			<i>Ophioglossum vulgatum</i>	
<i>Anthriscus sylvestris</i>			<i>Plantago lanceolata</i>	
<i>Bellis perennis</i>			<i>P. major</i>	
<i>Cardamine flexuosa</i>			<i>Ranunculus acris</i>	
<i>C. pratensis</i>			<i>Rosa</i> spp.	
<i>Cirsium arvense</i>			<i>Rumex acetosa</i>	
<i>Conopodium majus</i>			<i>R. acetosella</i>	
<i>Dactylis glomerata</i>			<i>Saxifraga granulata</i>	
<i>Digitalis purpurea</i>			<i>Senecio jacobaea</i>	
<i>Dryopteris affinis</i> ssp. <i>borreri</i>			<i>Taraxacum officinale</i> agg.	
<i>Epilobium montananum</i>			<i>Trifolium medium</i>	
<i>Festuca rubra</i>			<i>T. pratense</i>	
<i>Fraxinus excelsior</i>			<i>Urtica dioica</i>	
<i>Galium aparine</i>			<i>Veronica chamaedrys</i>	
<i>G. cruciata</i>			<i>Vicia sativa</i>	

Appendix 2 VASCULAR PLANTS RECORDED DURING THE TEESDALE ROADSIDE FLORA PROJECT (MAY - JULY 2002)

Scientific Name	Common Name
Horsetails	
<i>Equisetum arvense</i>	Field horsetail
<i>Equisetum palustre</i>	Marsh horsetail
Ferns	
<i>Ophioglossum vulgatum</i>	Common adder's-tongue
<i>Pteridium aquilinum</i>	Bracken
<i>Athyrium filix-femina</i>	Lady fern
<i>Dryopteris filix-mas</i>	Male fern
<i>Dryopteris cambrensis</i>	Western scaly male fern
<i>Dryopteris borrieri</i>	Scaly male fern
<i>Dryopteris dilatata</i>	Broad buckler fern
Buttercups	
<i>Caltha palustris</i>	Marsh marigold
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus repens</i>	Creeping buttercup
<i>Ranunculus bulbosus</i>	Bulbous buttercup
<i>Ranunculus flammula</i>	Lesser spearwort
<i>Ranunculus ficaria</i>	Lesser celandine
Poppy family	
<i>Meconopsis cambrica</i>	Welsh poppy
Elms	
<i>Ulmus glabra</i>	Wych elm
Nettles	
<i>Urtica dioica</i>	Common nettle
Oak family	
<i>Fagus sylvatica</i>	Beech
<i>Quercus petraea</i>	Sessile oak
<i>Quercus robur</i>	Pedunculate oak
<i>Betula pendula</i>	Silver birch
<i>Betula pubescens</i>	Downy birch
<i>Alnus glutinosa</i>	Alder
<i>Corylus avellana</i>	Hazel
Goosefoot & oraches	
<i>Chenopodium bonus-henricus</i>	Good King Henry
<i>Chenopodium album</i>	Fat hen
<i>Atriplex patula</i>	Common orache

Campions, sandworts & pinks	
<i>Spergularia marina</i>	Lesser sea spurrey
<i>Spergularia media</i>	Greater sea spurrey
<i>Stellaria holostea</i>	Greater stitchwort
<i>Cerastium fontanum</i>	Common mouse-ear
<i>Lychnis flos-cuculi</i>	Ragged robin
<i>Silene vulgaris</i>	Bladder campion
<i>Silene latifolia</i>	White campion
<i>Silene dioica</i>	Red campion
Docks	
<i>Fallopia japonica</i>	Japanese knotweed
<i>Rheum</i> sp.	Rhubarb
<i>Rumex acetosella</i>	Sheep's sorrel [agg.]
<i>Rumex acetosa</i>	Common sorrel
<i>Rumex crispus</i>	Curled dock
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Polygonum bistorta</i>	Common bistort
<i>Polygonum aviculare</i>	Knotgrass
<i>Polygonum persicaria</i>	Reshank
Limes	
<i>Tilia cordata x platyphyllos</i>	Lime
Violets	
<i>Viola riviniana</i>	Common dog-violet
<i>Viola palustris</i>	Marsh violet
<i>Viola odorata</i>	Sweet violet
Mustards, cresses & cabbages	
<i>Sisymbrium officinale</i>	Hedge mustard
<i>Sisymbrium orientale</i>	Eastern rocket
<i>Sinapsis arvensis</i>	Charlock
<i>Alliaria petiolata</i>	Garlic mustard
<i>Hesperis matronalis</i>	Dame's violet
<i>Cardamine pratensis</i>	Cuckoo-flower
<i>Cardamine hirsuta</i>	Hairy bitter-cress
<i>Cardamine amara</i>	Large bitter-cress
Heathers	
<i>Calluna vulgaris</i>	Heather
<i>Vaccinium myrtillus</i>	Bilberry
Sea Pinks	
<i>Armeria maritima</i>	Thrift

Primulas	
<i>Primula vulgaris</i>	Primrose
<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i> x <i>veris</i>	False oxlip
Rose family	
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Rubus idaeus</i>	Raspberry
<i>Rubus fruticosus</i> agg.	Bramble
<i>Cotoneaster horizontalis</i>	Cotoneaster
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Potentilla sterilis</i>	Barren strawberry
<i>Fragaria vesca</i>	Wild strawberry
<i>Geum rivale</i>	Water avens
<i>Geum urbanum</i>	Herb bennet
<i>Agrimonia eupatoria</i>	Agrimony
<i>Poterium sanguisorba</i>	Salad burnet
<i>Sanguisorba officinalis</i>	Great burnet
<i>Alchemilla acutiloba</i>	a Lady's mantle
<i>Alchemilla monticola</i>	a Lady's mantle
<i>Alchemilla xanthochlora</i>	a Lady's mantle
<i>Alchemilla filicaulis</i> ssp. <i>vestita</i>	a Lady's mantle
<i>Alchemilla glabra</i>	a Lady's mantle
<i>Alchemilla mollis</i>	a Lady's mantle
<i>Rosa arvensis</i>	Field rose
<i>Rosa canina</i> agg.	Dog rose
<i>Prunus spinosa</i>	Blackthorn
<i>Malus sylvestris</i> sens.str.	Crab apple
<i>Sorbus aucuparia</i>	Rowan
<i>Crataegus monogyna</i>	Hawthorn
Saxifrage family	
<i>Saxifraga granulata</i>	Meadow saxifrage
Stonecrop family	
<i>Sedum reflexum</i>	Reflexed stonecrop
Currant family	
<i>Ribes uva-crispa</i>	Gooseberry
<i>Ribes nigrum</i>	Blackcurrant
<i>Ribes sylvestre</i>	Redcurrant

Pea family	
<i>Genista tinctoria</i>	Dyer's greenweed
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil
<i>Vicia cracca</i>	Tufted vetch
<i>Vicia sepium</i>	Bush vetch
<i>Vicia sativa</i>	Common vetch
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Medicago lupulina</i>	Black medick
<i>Trifolium repens</i>	White clover
<i>Trifolium pratense</i>	Red clover
<i>Trifolium medium</i>	Zig-zag clover
<i>Trifolium dubium</i>	Lesser trefoil
<i>Cytisus scoparius</i>	Broom
<i>Ulex europaeus</i>	Gorse
Willowherbs	
<i>Epilobium hirsutum</i>	Great hairy willowherb
<i>Epilobium montanum</i>	Broad-leaved willowherb
<i>Chamerion angustifolium</i>	Rosebay willowherb
Dogwoods	
<i>Ilex aquifolium</i>	Holly
Spurges	
<i>Mercurialis perennis</i>	Dog's mercury
Flaxes	
<i>Linum catharticum</i>	Fairy flax
Maple family	
<i>Acer campestre</i>	Field maple
<i>Acer pseudoplatanus</i>	Sycamore
Wood-sorrel family	
<i>Oxalis acetosella</i>	Wood-sorrel
Geraniums	
<i>Geranium sylvaticum</i>	Wood crane's-bill
<i>Geranium pratense</i>	Meadow crane's-bill
<i>Geranium dissectum</i>	Cut-leaved crane's-bill
<i>Geranium endressii</i>	French crane's-bill
<i>Geranium lucidum</i>	Shining crane's-bill
<i>Geranium robertianum</i>	Herb-Robert
Ivy family	
<i>Hedera helix</i>	Ivy
Umbellifers (carrot family)	

<i>Anthriscus sylvestris</i>	Cow parsley
<i>Myrrhis odorata</i>	Sweet Cicely
<i>Conopodium majus</i>	Pignut
<i>Aegopodium podagraria</i>	Ground-elder
<i>Conium maculatum</i>	Hemlock
<i>Heracleum sphondylium</i>	Hogweed
<i>Torilis japonica</i>	Upright hedge-parsley
Bindweeds	
<i>Calystegium sylvatica</i>	Large bindweed
<i>Calystegium sepium</i>	Hedge bindweed
Borage family	
<i>Myosotis caespitosa</i>	Tufted forget-me-not
<i>Myosotis scorpioides</i>	Water forget-me-not
<i>Myosotis discolor</i>	Changing forget-me-not
<i>Myosotis stolonifera</i>	Forget-me-not
<i>Pentaglottis semipervirens</i>	Green alkanet
Mints (labiates)	
<i>Betonica officinalis</i>	Betony
<i>Stachys sylvatica</i>	Hedge woundwort
<i>Lamium album</i>	White dead-nettle
<i>Teucrium scorodonia</i>	Wood sage
<i>Ajuga reptans</i>	Bugle
<i>Prunella vulgaris</i>	Selfheal
<i>Glechoma hederacea</i>	Ground Ivy
<i>Thymus polytrichus</i>	Wild thyme
<i>Origanum vulgare</i>	Marjoram
Plantains	
<i>Plantago major</i>	Greater plantain
<i>Plantago media</i>	Hoary plantain
<i>Plantago lanceolata</i>	Ribwort plantain
Olive family	
<i>Fraxinus excelsior</i>	Ash
<i>Syringa vulgaris</i>	Lilac
Figworts and speedwells	
<i>Digitalis purpurea</i>	Foxglove
<i>Veronica serpyllifolia</i>	Thyme-leaved speedwell
<i>Veronica officinalis</i>	Heath speedwell
<i>Veronica chamaedrys</i>	Germander speedwell
<i>Rhinanthus minor</i>	Yellow-rattle

Bellflowers	
<i>Campanula rotundifolia</i>	Harebell
<i>Campanula latifolia</i>	Giant bellflower
Bedstraws	
<i>Galium saxatile</i>	Heath bedstraw
<i>Galium verum</i>	Lady's bedstraw
<i>Galium mullago</i>	Hedge bedstraw
<i>Galium cruciata</i>	Crosswort
<i>Galium aparine</i>	Cleavers
Honeysuckle family	
<i>Sambucus nigra</i>	Elder
<i>Viburnum opulus</i>	Guelder-rose
<i>Lonicera periclymenum</i>	Honeysuckle
Valerian family	
<i>Valeriana officinalis</i>	Common valerian
Teasel family	
<i>Knautia arvensis</i>	Field scabious
<i>Succisa pratensis</i>	Devil's-bit scabious
Composites (dandelion fam.)	
<i>Cirsium vulgare</i>	Spear thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium heterophyllum</i>	Melancholy thistle
<i>Centaurea nigra</i>	Common knapweed
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Leontodon autumnalis</i>	Autumn hawkbit
<i>Leontodon hispidus</i>	Rough hawkbit
<i>Tragopogon pratensis</i>	Goat's-beard
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Crepis capillaris</i>	Smooth hawk's-beard
<i>Pilosella officinarum</i>	Mouse-ear-hawkweed
<i>Hieracium</i> spp.	a hawkweed
<i>Hieracium (perpropinquuum?)</i>	a hawkweed
<i>Lapsana communis</i>	Nipplewort
<i>Sonchus arvensis</i>	Perennial sow-thistle
<i>Sonchus asper</i>	Prickly sow-thistle
<i>Bellis perennis</i>	Daisy
<i>Matricaria matricoides</i>	Pinappleweed
<i>Achillea millefolium</i>	Yarrow

<i>Chrysanthemum leucanthemum</i>	Oxeye daisy
<i>Senecio jacobaea</i>	Common ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Tussilago farfara</i>	Colt's-foot
<i>Petasites hybridus</i>	Butterbur
Rushes and wood-rushes	
<i>Juncus squarrosus</i>	Heath rush
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus conglomeratus</i>	Compact rush
<i>Luzula campestris</i>	Field wood-rush
<i>Luzula multiflora</i>	Heath wood-rush
Sedges	
<i>Carex ovalis</i>	Oval sedge
<i>Carex sylvatica</i>	Wood-sedge
<i>Carex flacca</i>	Glaucous sedge
<i>Carex panicea</i>	Carnation sedge
<i>Carex demissa</i>	Common yellow sedge
<i>Carex hirta</i>	Hairy sedge
<i>Carex nigra</i>	Common sedge
Grasses	
<i>Nardus stricta</i>	Mat-grass
<i>Festuca gigantea</i>	Giant fescue
<i>Festuca rubra sens.str.</i>	Red fescue
<i>Festuca ovina</i> agg.	Sheep's fescue [agg.]
<i>Lolium perenne</i>	Perennial rye-grass
<i>Cynosurus cristatus</i>	Crested dog's-tail
<i>Poa annua</i>	Annual meadow-grass
<i>Poa trivialis</i>	Rough meadow-grass
<i>Poa pratensis</i>	Smooth meadow-grass
<i>Briza media</i>	Quaking grass
<i>Dactylis glomerata</i>	Cock's-foot
<i>Helictotrichon pubescens</i>	Downy oat-grass
<i>Arrhenatherum elatius</i>	False oat-grass
<i>Trisetum flavescens</i>	Yellow oat-grass
<i>Deschampsia cespitosa</i>	Tufted hair-grass
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Agrostis capillaris</i>	Common bent

<i>Agrostis stolonifera</i>	Creeping bent
<i>Alopecurus pratensis</i>	Meadow foxtail
<i>Alopecurus geniculatus</i>	Marsh foxtail
<i>Phleum pratense</i>	Timothy
<i>Bromus erectus</i>	Upright brome
<i>Brachypodium sylvaticum</i>	False-brome
<i>Elymus repens</i>	Common couch
<i>Molinia caerulea</i>	Purple moor grass
<i>Hordeum murinum</i>	Wall barley
Arum family	
<i>Arum maculatum</i>	Lord and ladies
Lilies	
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Allium ursinum</i>	Ramsons
<i>Narcissus</i> sp.	Daffodil
Orchids	
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid
<i>Dactylorhiza purpurella</i>	Northern marsh-orchid

All the species listed in Appendices 1 to 6 were observed during the fieldwork phase of the Teesdale Roadside Flora Project.

Appendix 3 LICHENS

Although lichens do not frequently occur amongst verge vegetation, the roadside trees and drystone walls provide a suitable habitat for a rich lichen flora. Drystone walls and bridges were seen to be particularly important habitats and supported dense growths of foliose lichens. The abundance of foliose and fructose lichens suggests low levels of atmospheric pollution.

Appendix 4 INVERTEBRATES

Damselflies

<i>Enallagma cyathigerum</i>	Common blue damselfly
<i>Ischnura elegans</i>	Blue-tailed damselfly

Butterflies

<i>Polyommatus icarus</i>	Common blue
<i>Lycaena phlaeus</i>	Small copper
<i>Inachis io</i>	Peacock
<i>Vanessa atalanta</i>	Red admiral
<i>Anthocharis cardamines</i>	Orange tip
<i>Artogeia rapae</i>	Small white

<i>Pieris brassicae</i>	Large white
<i>Maniola jurtina</i>	Meadow brown
<i>Coeonympha pamphilus</i>	Small heath
<i>Thymelicus sylvestris</i>	Small skipper
<i>Ochlodes venatus</i>	Large skipper
<i>Aglais urticae</i>	Small tortoiseshell
<i>Lasionmmata megera</i>	Wall brown
<i>Euchloe belemia</i>	Green-veined white

Moths

<i>Zygaena filipendilae</i>	Six-spot burnet
<i>Odezia atrata</i>	Chimney sweeper

Others

<i>Chorthippus spp.</i>	Grasshopper species
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Appendix 5 VERTEBRATES

REPTILIA and AMPHIBIA (Reptiles and Amphibians)

<i>Lacerta vivipara</i>	Common/viviparous lizard
<i>Bufo bufo</i>	Common toad
<i>Rana temporaria</i>	Common frog

AVES (Birds)

<i>Ardea cinerea</i>	Grey heron
<i>Accipiter nisus</i>	Sparrowhawk
<i>Falco tinnunculus</i>	Kestrel
<i>Perdix perdix</i>	Grey partridge
<i>Phasianus colchicus</i>	Pheasant
<i>Himantopus ostralegus</i>	Oystercatcher
<i>Pluvialis apricaria</i>	Golden plover
<i>Vanellus vanellus</i>	Lapwing
<i>Gallinago gallinago</i>	Snipe
<i>Numenius arquata</i>	Curlew
<i>Tringa totanus</i>	Redshank
<i>Actites hypocleucos</i>	Common sandpiper
<i>Larus ribibundus</i>	Black headed gull
<i>Larus fuscus</i>	Lesser black-backed gull
<i>Larus argentatus</i>	Herring gull
<i>Colmba livia</i>	Feral pigeon
<i>Columba oenas</i>	Stock dove
<i>Columba palumbas</i>	Wood pigeon

<i>Streptopelia decaocto</i>	Collared dove
<i>Cuculus canorous</i>	Cuckoo
<i>Apus apus</i>	Swift
<i>Alauda arvensis</i>	Skylark
<i>Riparia riparia</i>	Sand martin
<i>Hirundo rusticola</i>	Swallow
<i>Delichon urbica</i>	House martin
<i>Anthus pratensis</i>	Meadow pipit
<i>Motacilla flava</i>	Yellow wagtail
<i>Motacilla cinera</i>	Grey wagtail
<i>Motacilla alba yarellii</i>	Pied wagtail
<i>Troglodytes troglodytes</i>	Wren
<i>Prunella modularis</i>	Dunnock
<i>Erithacus rubecula</i>	Robin
<i>Turdus merula</i>	Blackbird
<i>Turdus philmelos</i>	Song thrush
<i>Turdus viscivorus</i>	Mistle thrush
<i>Sylvia communis</i>	Whitethroat
<i>Sylvia borin</i>	Garden warbler
<i>Sylvia atricapilla</i>	Blackcap
<i>Phylloscopus collybita</i>	Chiffchaff
<i>Phylloscopus trochilus</i>	Willow warbler
<i>Muscicapa striata</i>	Spotted flycatcher
<i>Parus ater</i>	Coal tit
<i>Parus caeruleus</i>	Blue tit
<i>Parus major</i>	Great tit
<i>Pica pica</i>	Magpie
<i>Corvus monedula</i>	Jackdaw
<i>Corvus frugilegus</i>	Rook
<i>Corvus corone corone</i>	Carrion crow
<i>Sturnus vulgaris</i>	Starling
<i>Passer domesticus</i>	House sparrow
<i>Fringilla coelebs</i>	Chaffinch
<i>Carduelis chloris</i>	Greenfinch
<i>Carduelis carduelis</i>	Goldfinch
<i>Carduelis cannabina</i>	Linnet
<i>Pyrrhula pyrrhula</i>	Bullfinch
<i>Emberiza citrinella</i>	Yellowhammer
<i>Emberiza schoeniclus</i>	Reed bunting

MAMMALIA (Mammals)

<i>Erinaceus europaeus</i>	Hedgehog
<i>Talpa europaea</i>	Mole
<i>Sorex araneus</i>	Common shrew
<i>Oryctolagus cuniculus</i>	Rabbit
<i>Lepus europaeus</i>	Hare
<i>Sciurus carolinensis</i>	Grey squirrel
<i>Clethrionomys glareolus</i>	Bank vole
<i>Microtus agrestis</i>	Short-tailed vole
<i>Apodemus sylvaticus</i>	Wood mouse
<i>Vulpes vulpes</i>	Fox
<i>Mustela ermina</i>	Stoat

Appendix 6 SPECIES RICHNESS IN RED, AMBER AND GREEN SITES – WEARDALE 2001

This appendix is included as a means of highlighting part of the ‘determining process’ that was employed when identifying ‘red’, ‘amber’ and ‘green’ sites – it is based on work undertaken in Weardale during 2001 (Daly 2001). One of the criteria used when deciding whether a verge should be classed as amber, red or green was the number of species present. The table below shows the mean species richness for five separate sites in Weardale (2001).

In order to obtain this data, five different roadside areas in Weardale were selected as follows:

Area 1: Midway between the junction of the A68 and A689

Area 2: Halfway between Wolsingham and Frosterley

Area 3: East of Frosterley

Area 4: Western border of Stanhope

Area 5: West of Eastgate, near Lafarge Cement UK’s Weardale Works

At each general location, a ‘red’, ‘amber’ and ‘green’ site in close proximity to each other were identified and the number of different species present in five 1metre² quadrats within each site was recorded, with the mean value for the five quadrats calculated. The results are shown in Table 2.

Table 2: Mean species richness (from data analysed for five 1metre² quadrats s at five different sites)

Site Number	Site Category <u>Red</u>	Standard Error of the Mean	Site Category <u>Amber</u>	Standard Error of the Mean	Site Category <u>Green</u>	Standard Error of the Mean
1	13.4	1.21	8.4	0.93	7.8	0.37
2	11.8	1.20	11.2	0.58	6.4	0.60
3	8.2	0.97	6.4	0.60	4.4	0.81

4	9.6	0.40	12.6	0.75	5.2	0.58
5	7.4	1.17	5.6	0.93	4.2	0.66
1-5	<u>10.08</u>		<u>8.84</u>		<u>5.6</u>	

(after Daly, 2001)

The data shown in the above table confirms, in four examples out of five, the validity of the subjective method of assigning verges to red, amber or green categories. However, it should be noted that species richness was not the only criterion used when assigning verges to categories. The suite of species present and the presence of rare species or those of local interest were other criteria that were used. It is also important to note that the sites were not of uniform size.

GLOSSARY

AONB Area of Outstanding National Beauty. A landscape designation, used to highlight the importance of landscape that is of equivalent value to a National Park, but without any of the planning and designation structures that are associated with National Parks.

Apomictism The ability (in plants) to set fertile seed without the need for pollination.

Biodiversity Biological diversity, i.e. the variety of life; all wildlife and its habitats. The term embraces the full range of habitats, species, and the variation found within species (i.e. genetic variation) across those areas in which these species and habitats occur or would be expected to occur. Often used to refer to all of the wildlife found within a habitat or area.

Biodiversity Action Plan (BAP) A plan to conserve or re-create biodiversity. The term may be used to describe the whole process by which this happens, the 'biodiversity action planning process', or sometimes a document that sets out how this is to be achieved.

County Wildlife Site A site of local nature conservation importance, designated for its local wildlife importance but which has no statutory protection (sometimes known as an SSCI).

Durham Biodiversity Action Plan (DBAP) The local biodiversity action plan for County Durham, Gateshead, Darlington, South Tyneside and the City of Sunderland. The term is also used to describe the process by which action is taken locally to conserve wildlife, specifically those habitats and species for which our area has a special responsibility under the UK BAP.

Durham Wildlife Audit A thorough habitat survey of County Durham and Darlington that mapped and measured the amounts of important wildlife habitat across the county in the early 1990s.

Ecology The study of the inter-relationships between plants, animals and other organisms within the environment or habitat.

Ecosystem An interacting network of physical environment, plants and animals within a particular habitat all dependent, in one way or another, on each other.

Environmentally Sensitive Area (ESA) A designation which pertains to agricultural practice in an area of wildlife-sensitive landscape. Special grants are available within ESAs for wildlife-sensitive management.

Flora and Fauna A collective term denoting the plant and animal life of an area or habitat.

Geomorphology The shape of the landscape as dictated by the interaction of underlying geological strata as well as short, and long, term climatic processes and factors e.g. glaciation.

Gley A sticky waterlogged soil that is grey/blue in colour.

Habitat Action Plan (HAP) One of the two sorts of plans contained within the DBAP document (see also SAP). A HAP is geared toward the conservation or re-creation of a particular habitat such as lowland heathland, upland oak wood or limestone grassland.

Habitat A part of the landscape which takes its character from particular types of vegetation e.g. marsh or woodland, and which is inhabited by a characteristic suite of flora and fauna.

Halophytic Salt-loving/tolerant, usually referring to plants or animals.

Herpetofauna/herpetiles Amphibians and reptiles.

Indicator Species A species whose presence or status provides information on the health/condition of an ecosystem. Otter is such a species for rivers.

International Convention on Biodiversity (1992) A convention, negotiated under the auspices of the United Nations Environment Programme (UNEP), which came about as a result of the 1992 'Rio Earth Summit'. The convention has the following objectives: conservation of biological diversity; sustainable use of its components; fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. The convention came into force on 29th December 1993 and, to date, 163 countries have become parties to it. The convention provides a framework to develop national strategies, plans and programmes and under the convention all signatories are expected to produce BAPs.

Invertebrate Any animal lacking a backbone. This group include insects (e.g. butterflies, moths, flies, bees, wasps, beetles) and non-insect invertebrates (e.g. worms, molluscs - such as snails and slugs - and crustaceans, such as crabs and crayfish).

Local Biodiversity Action Plan (LBAP) Local Biodiversity Action Plans are plans drawn up to prioritise and direct action for threatened species and habitats in the local context as well as to deliver the local element of the nationally identified targets. The Department of the Environment, Food and Rural Affairs (DEFRA) have determined that amongst the key functions of LBAPs are: ensuring that national targets for species and habitats, as specified in the UK Biodiversity Action Plan, are translated into effective local action and to raise awareness of the need for biodiversity conservation in the local context.

Local Agenda (or Action) 21 (LA21), [part of Agenda (or Action) 21] An environmental agenda for the 21st Century dealing with social and economic dimensions, the conservation and management of natural resources, the strengthening of the role of major groups as well as looking at the means of implementation. LA21, describes the actions we must take locally to promote sustainability and sustainable development, which has its origins in the 1992 'Rio Earth Summit'. Sustainable development has been described as "development that meets the needs of the present, without compromising the ability of future generations to meet their own needs".

LNR Local Nature Reserve.

Native Species Plants, animals or fungi that occur naturally in a habitat or region.

NNR National Nature Reserve.

NVC National Vegetation Classification, a system for defining habitat types by analysing the various components (i.e. the species present and the area each covers) of the vegetation that constitute the habitat.

Podzol An acidic infertile soil with minerals leached from its surface layers to lower horizons.

Rio Earth Summit The United Nations Convention on Environment and Development (UNCED) held in Rio de Janeiro in June 1992 i.e. the 'Earth Summit'. This was convened to address a range of global environmental issues such as loss of biodiversity, loss of natural resources and

climate change. This summit produced two international agreements (the UN Framework Convention on Climate Change and the UN Convention on Biological Diversity), two statements of principles (the Rio Declaration on Environment and Development, and a statement of principles on management and conservation on all types of forests) as well as a major agenda on worldwide sustainable development i.e. Agenda 21.

SAC Special Area of Conservation. A designation made under the European Habitats Directive that highlights the particular importance of an area for its specialised flora and habitats.

Species Action Plan (SAP) One of two sorts of plans contained within the DBAP document (see also HAP). A plan geared toward the conservation or re-introduction of a particular species, such as red squirrel.

Site of Special Scientific Interest (SSSI) A nationally important wildlife or geological site, which has legal protection under the Wildlife and Countryside Act (1981).

Site of Nature Conservation Importance (SNCI) A site designated for its local wildlife importance but which has no legal protection (sometimes known as a County Wildlife Site or a SINC - 'site of importance for nature conservation').

Species A taxonomic group into which a genus is divided, the members of which are capable of interbreeding. For example, the blackbird and song thrush are related and are in the same genus, but are different species. This is shown in these birds' scientific names; the blackbird is *Turdus merula* and the song thrush *Turdus philomelos*. They both share the genus name *Turdus* and the second name is the species name.

Standard Error of the Mean In statistics, the standard deviation of a sample measures is used to find the average deviation of the measurements taken from the mean of that sample. If many samples are taken from a population, these sample means will vary. It is possible to calculate the standard deviation for the sample means to see how scattered they are. To distinguish this from the original standard deviation, this statistic is referred to as the standard error of the mean.

Stagnogleys Seasonally waterlogged gley soils

Stagnohumic gleys Slowly permeable seasonally waterlogged fine loamy soils with a peaty surface horizon.

Taxon (plural Taxa) A systematic unit within a taxonomy, that is used to name and highlight the degree of inter-relatedness of flora and fauna e.g. family (swallow family - hirundines), genus (swallow - *Hirundo rusticola*) or species (swallow - *Hirundo rusticola*).

UK Biodiversity Action Plan 'Biodiversity: The Action Plan (1994)', the BAP for the United Kingdom, which has its roots in the 1992 'Rio Earth Summit'. Various UK BAP documents have been produced by the UK government which detail actions necessary for a wide range of the country's habitats and most threatened plants and animals. The UK BAP forms the basis for all local Biodiversity Action Plans as well as other initiatives.

Vertebrate Any animal with a backbone, e.g. fish, amphibian, bird or mammal.

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