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Making the best of byways

A practical guide for local authorities managing and maintaining byways which carry motor vehicles

December 2005

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Contents

1. Introduction

A byway open to all traffic is a highway over which the public have a right of way for vehicular and all other kinds of traffic, but which is used by the public mainly for the purpose for which footpaths and bridleways are used.

Byways open to all traffic are 3744 km (2%) of the recorded rights of way network in England and 431 km (1.5%) in Wales. Recent research in England shows that 48% of users on byways open to all traffic are on foot, 42% are using mechanically propelled vehicles, 7% are cycling and 3% are on horseback [Defra, 2005].

This guide has been prepared to support the management of byways where problems exist. Such problems might include:

- Conflicts between users
- Poor surface conditions
- Increases in byway use

A waymarked byway open to all traffic.

This guide focuses on the management of byways in England and Wales which carry motor vehicles. Its two objectives are:

1. To provide an informative document for authorities and user groups with an interest in the use of motor vehicles on byways and the management of such routes.
2. To provide a practical reference manual for authorities, land owners, contractors, volunteer groups and others involved in the maintenance of byways.

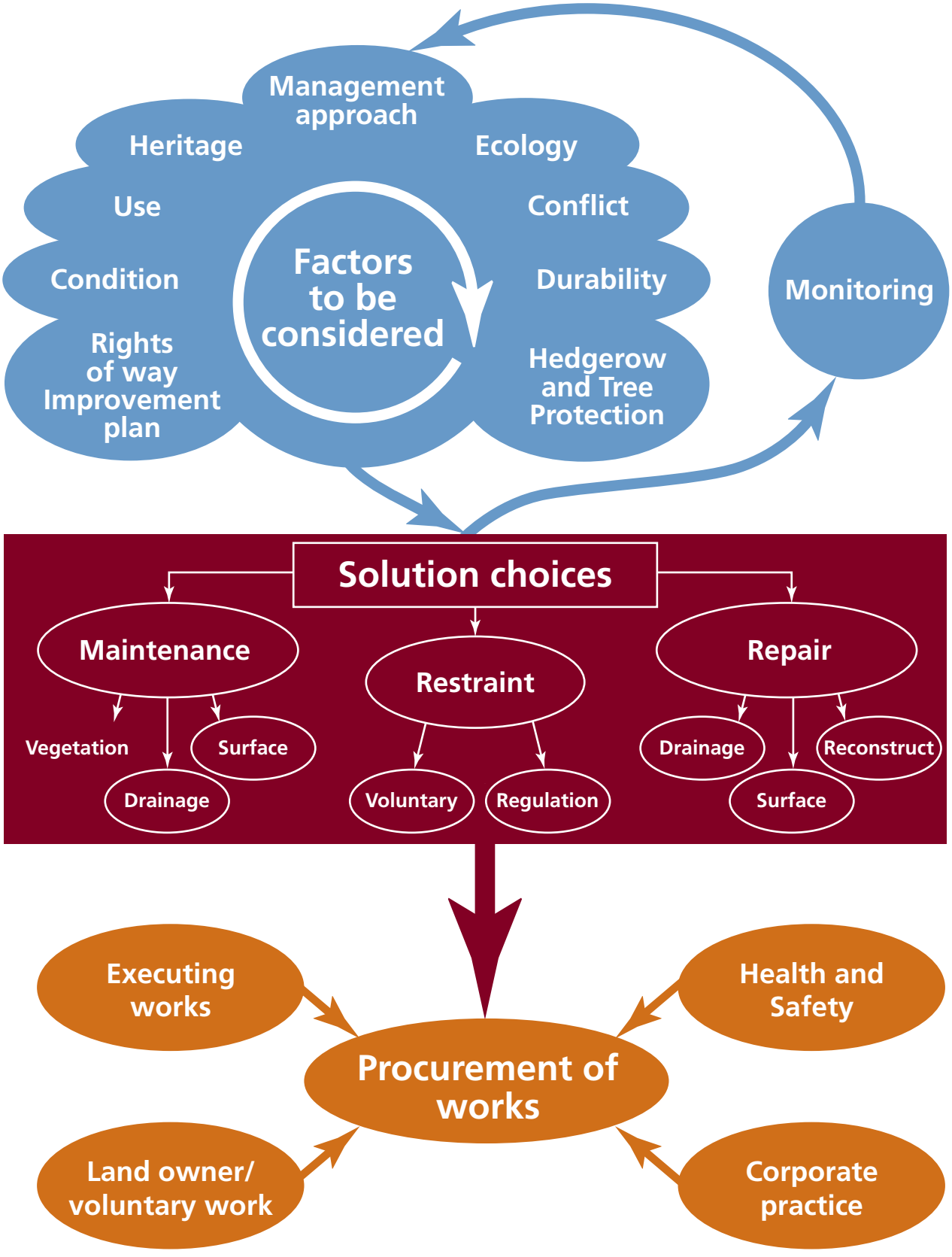
1.1 Using this guide

One approach to determine an appropriate response to a problem is shown in the flow diagram in Figure 1. This guide provides information in support of this flow diagram to enable readers to easily find relevant information.

Case studies are shown in boxes throughout the guide.

References to published documents are shown in their relevant place in the text between square brackets, for example, [Defra, 2005]. Full details of these reference documents are given at the end of the guide. Titles of legislation and statutory instruments are given in the text and are not included as references. UK Acts of Parliament from 1988 to present, and UK Statutory Instruments from 1987 to present (including Statutory Instruments made by the National Assembly for Wales), are available electronically at the web site of Her Majesty's Stationery Office (www.hmso.gov.uk).

Figure 1: Flow diagram showing an approach to finding an appropriate response to byway problems



1.2 Terms and phrases used in this guide

This guide uses the phrase 'byway' when referring to routes which are unsealed and have rights of way for mechanically propelled traffic. This includes unsealed byways open to all traffic and other routes, such as some unsealed, unclassified roads. The guide does not concern itself with sealed routes (for example, those with an asphalt or concrete surface course). This guide preferentially uses the phrases unsealed and sealed rather than unmetalled and metalled, which can be confusing to some readers.

The phrase 'mechanically propelled vehicles' is preferred to the term 'motorised vehicles' and is taken to include 4 wheel drive cars (4x4), trail motorcycles, tractors, quadricycles (also known as all terrain vehicles and quads), delivery vans, military vehicles and 'road cars' owned by residents of dwellings accessed by byways. It does not include mobility scooters as defined in The Use of Invalid Carriages on Highways Regulations 1988 (Statutory Instrument 1988 No. 2268).

In the context of this guide, the phrase 'recreational driving' is taken to mean the driving or riding of mechanically propelled vehicles as a recreational pursuit on byways. It does not include the driving of horse drawn carriages. The term 'driving' is used generically to include the riding of motorcycles and quadricycles.

The generic term 'user group' includes walkers, horse riders, carriage drivers, cyclists, 4x4 drivers, motorcycle riders, wheelchair users, farmers, users for residential access and all other byway users. Specific user groups are highlighted where relevant. 'Stakeholders' refers to anyone who has an interest in the management and maintenance of byways and includes user groups, land owners and authorities.

The term 'land owners' is taken to mean land owners, occupiers or lessees, and other land holders, as well as land managers and others with a similar interest in the land over which byways pass.

The word 'authority' is used throughout this document to mean a local authority with the responsibility for management and maintenance of byways at the public expense.

In this guide, 'maintenance' means regular activities that maintain the byway condition (such as clearing vegetation or emptying drainage ditches), or small scale construction works (such as infilling holes). 'Repair' works are larger projects which deal with defects in the byway (such as resurfacing, strengthening or drainage works).

2. Factors to be considered

All of the following factors should be considered when determining the byway problem and hence the appropriate solution:

- Any conflicts between user groups.
- The local rights of way improvement plan.
- The durability of the byway.
- The condition of the byway.
- The use of the byway.
- Hedgerow and tree protection.
- The heritage of the byway and its surroundings.
- Any ecological sensitivity associated with the byway.
- The management approach.

These factors are not presented in any particular order, since they are all important to byway management. This section of the guide briefly reviews each of these factors. In addition, this section discusses monitoring and review of solutions to ensure that the problem has been dealt with effectively or to respond to new problems when they occur.

Sarn Helen Roman road

This Roman road connects Neath with Coelbren Roman fort. This byway open to all traffic runs through the Brecon Beacons National Park is approximately 10 km long with an initial steep gradient before following a ridge over open moorland and through a Forestry Commission plantation. After the plantation, the byway passes an open cast colliery site at Dyffryn Cellwen before reaching Coelbren.

The steep gradient section of the byway is mainly on bedrock. Some moorland sections are particularly susceptible to damage because of their boggy nature. The section through the plantation has been maintained by the Forestry Commission, with stone from their own quarries, to ensure continued access for their vehicles. The surface deteriorates again at the edge of the plantation but has been reinstated at Dyffryn Cellwen.

The route of Sarn Helen Roman road (reproduced by kind permission of Neath Port Talbot County Borough Council)

During the late 1980s some sections of the byway were damaged through over use. A user survey conducted by the access project officer in the early 1990s revealed that recreational drivers were mainly using the route in the winter, enjoying the challenge of the route in adverse weather conditions. The survey also showed that private vehicular traffic had little effect on the road.

At that time, a repeating seasonal traffic regulation order was used to protect the way during the wettest part of the year, from December through to the end of March. The deterioration continued as the route was wet, and vulnerable to deterioration, in October, November, April and May, when driving was not prohibited. The area was featured in some off road magazines and two bomb craters either side of the way were proving to be an attraction to 'mud pluggers'. This deviation from the byway severely damaged the surrounding area.

A flooded section of Sarn Helen Roman road (photograph courtesy of Neath Port Talbot County Borough Council)

The route was closed for a continuous 18 month period between 1994 and 1996 using a traffic regulation order. During this time ditching, culverting and surfacing work was carried out using the Forestry Commission as the contractor. Local stone from the Forestry Commission quarry was used. The route was repaired to a standard within expectations of byway users and in keeping with local character.

After the reopening in 1996 damage occurred at the northern end of the route. In 1997/98 further drainage and surfacing work was undertaken, using stone from the open cast mine to resurface an 800 m section. There were appeals to permanently close the byway to motorised vehicles. The preferred option, now in place, was to make a seasonal traffic regulation order which allows mechanically propelled vehicle use in June, July and August.

Since the reopening in 1998 only one section has required maintenance, costing £3,500 compared to a previous annual expenditure up to £25,000. The authority is now monitoring the byway's ability to sustain mechanically propelled vehicles, and if the evidence is supportive, may review the seasonal traffic regulation order period, possibly by reducing the closure period from 9 to 7 months.

2.1 Conflicts between user groups

Discussions with authorities during the preparation of this guide support the belief that, in general, there is minimal direct conflict between byway users. This anecdotal conclusion is indirectly supported by the research conducted by other organisations [Sheffield Hallam University, 2004a, Sheffield Hallam University, 2004b, Countryside Agency, 2001b, ADAS Consulting, 2003a, Rural Resources, 2004a].

However, conflicts between users do occur, particularly where there is significant use of byways for recreational driving and use by other, non-mechanically propelled users. Where conflict occurs, authorities should examine the nature and causes of this conflict and establish measures to minimise its occurrence. This might include forming a local byway user group to discuss and resolve problems, erecting byway signs and developing a code of conduct.

4x4 drivers using Gatescarth Pass on a permit day (photograph courtesy of the Lake District National Park Authority)

Information from the Lake District National Park Authority notes that complaints concerning recreational driving occur where the byways are more heavily used for recreational driving and are also popular with walkers, cyclists and horse riders [Robinson, D., and Wilson, G., 2001].

2.1.1 Setting a policy

A clear and transparent policy for the management of byways which addresses stakeholder concerns is important to managing byways and minimising conflict.

The management plan for the Lake District National Park Authority [Lake District National Park Authority, 2004] states that the authority believes that recreational driving is an inappropriate activity for the park. However, the authority also recognises the demand for recreational driving, acknowledges that legal rights exist and that there is a need to ensure that this activity is managed effectively, aiming to eliminate unsustainable use and reduce conflict between users through the Hierarchy of Trail Routes. The management plan includes specific policies to:

- Work with relevant users, land owners and managers to manage recreational pursuits, resolve conflict, encourage responsible use and promote appropriate guidance.
- Collaborate with others to ensure that recreational activities, such as recreational green road driving, gill scrambling or large scale events, do not have a detrimental impact on local communities, nature conservation interests, historic features or the landscape.

The Lake District National Park Authority Hierarchy of Trail Routes was initiated to address community concerns over recreational driving in the park, break down barriers that had developed through opposing attitudes and avoid where possible time-consuming, costly, and potentially ineffective adversarial legislative measures. The 2001 review of the Hierarchy of Trail Routes [Robinson, D., and Wilson, G., 2001] included the finding that, following the erection of signs advising recreational drivers of the voluntary restraint imposed on a route, complaints reduced by 50%. There was no evidence that signing had promoted or increased recreational driving, as was feared by many parishes and residents.

Derbyshire County Council has published its policy on the use of mechanically propelled vehicles in the countryside. This states that where a right to drive a mechanically propelled vehicle exists, the Council will assert and protect this right, providing the use is sustainable and does not compromise the safety of other users [Derbyshire County Council, 2003].

Northumberland County Council's "Framework for the management of byways open to all traffic" has the overriding objective of ensuring that the byways open to all traffic in the county, including those in the Northumberland National Park, "fulfil their maximum potential for balanced and safe recreational use subject to environmental considerations" [Northumberland County Council, 2004].

The "Nidderdale Area of Outstanding Natural Beauty Management Plan 2004 – 2009" includes a policy to encourage local authorities, the local community and user groups to develop a strategic approach to the use of off-road vehicles for recreation by collecting information, developing best practice through pilot projects, and enforcement of relevant legislation [Nidderdale Area of Outstanding Natural Beauty, 2004].

The Defra consultation paper on "Use of mechanically propelled vehicles on rights of way" [Defra 2004] highlighted the work of Cornwall County Council to tackle illegal motorcycle use in the countryside. The approach is bringing together relevant stakeholders to deliver change and, amongst other stages of the approach, an information sheet is being developed which, in draft form, highlights the issues, the signage used to identify the different rights of way and on which routes motorcycling is permitted, and the legal powers available with respect to illegal use. The Council hope to be able to fund a project officer to work with local communities, land owners, user groups and statutory agencies to identify suitable sites, alongside land management initiatives, to restrict illegal use.

This work includes identifying the value of off road motorcycling facilities within a new motorcycling strategy (produced in connection with the production of the local transport plan) and liaising with planning authorities to consider appropriate provision within local development frameworks.

2.1.2 Achieving consensus

Working with byway users is an important facet in overcoming conflict. A byway user group to discuss and address the problems that occur on byways and to take ownership of the problems and their solution is an integral part of the Lake District's Hierarchy of Trail Routes [Land Access and Recreation Association, 1997] and has had some degree of success elsewhere.

A part of the philosophy underlying the Hierarchy of Trail Routes is the achievement of consensus when managing recreational driving in the Lake District National Park. The Trails Management Advisory Group meets quarterly and aims to achieve a reconciliation of views. It includes authority representatives, members of local recreational vehicle driving clubs, other route user groups, parish and county councils, land owner organisations, and conservation and lobby groups. The Advisory Group makes recommendations which are submitted to the Lake District National Park Authority's Implementation Committee for approval.

The Advisory Group brings together a "wide range of experience and expertise and adds both quality and weight to any decision-making process". The first report on the Hierarchy of Trail Routes published in 1997 indicates that the consensus approach is reliant on everyone involved accepting the reality of and constraints imposed by the current situation, but does not require that individuals or organisations abandon their philosophies or policies relevant to the situation. This acceptance is exemplified by the Lake District National Park Authority's policy on recreational driving, and its positive involvement in the hierarchy. The consensus-based approach has led to support for the use of traffic regulation orders where the level of restraint thought necessary could not be achieved by voluntary measures.

Additionally, twice a year representatives of recreational driving groups meet officers of the National Park Authority and the County Council, under the chairmanship of one of the user group representatives, to discuss matters arising and agree site or route specific measures which may be passed to the Trail Management Advisory Group for consideration. This is regarded as an important element of the process as the recreational drivers take ownership of the problems and the solutions to them.

The Surrey Byway User Group has proved successful in facilitating a positive approach to byway management and has led to increased understanding of the resource constraints within which Surrey County Council's rights of way officers work. The Group meets quarterly and allows an opportunity to discuss relevant problems and their solution.

2.1.3 Signing routes

Work for the Countryside Agency, examining the conflicts that arise on shared use routes which do not carry vehicular rights, resulted in recommendations to minimise conflict on such routes [Uzzell, D. et al, 2002]. One of the recommendations was the use of information panels at the access points of shared use routes. Amongst other items, the panel should include details of any code of conduct, a contact person to receive comments, complaints and reports of conflict, and the authority responsible for the route. This has similarities to the advisory signs used in the Lake District's Hierarchy of Trail Routes and might partly account for the success of this approach.

At the start of the Hierarchy of Trail Routes, all the routes in the Lake District National Park were surveyed and evaluated for classification into different categories of use. The routes were evaluated against agreed criteria which included:

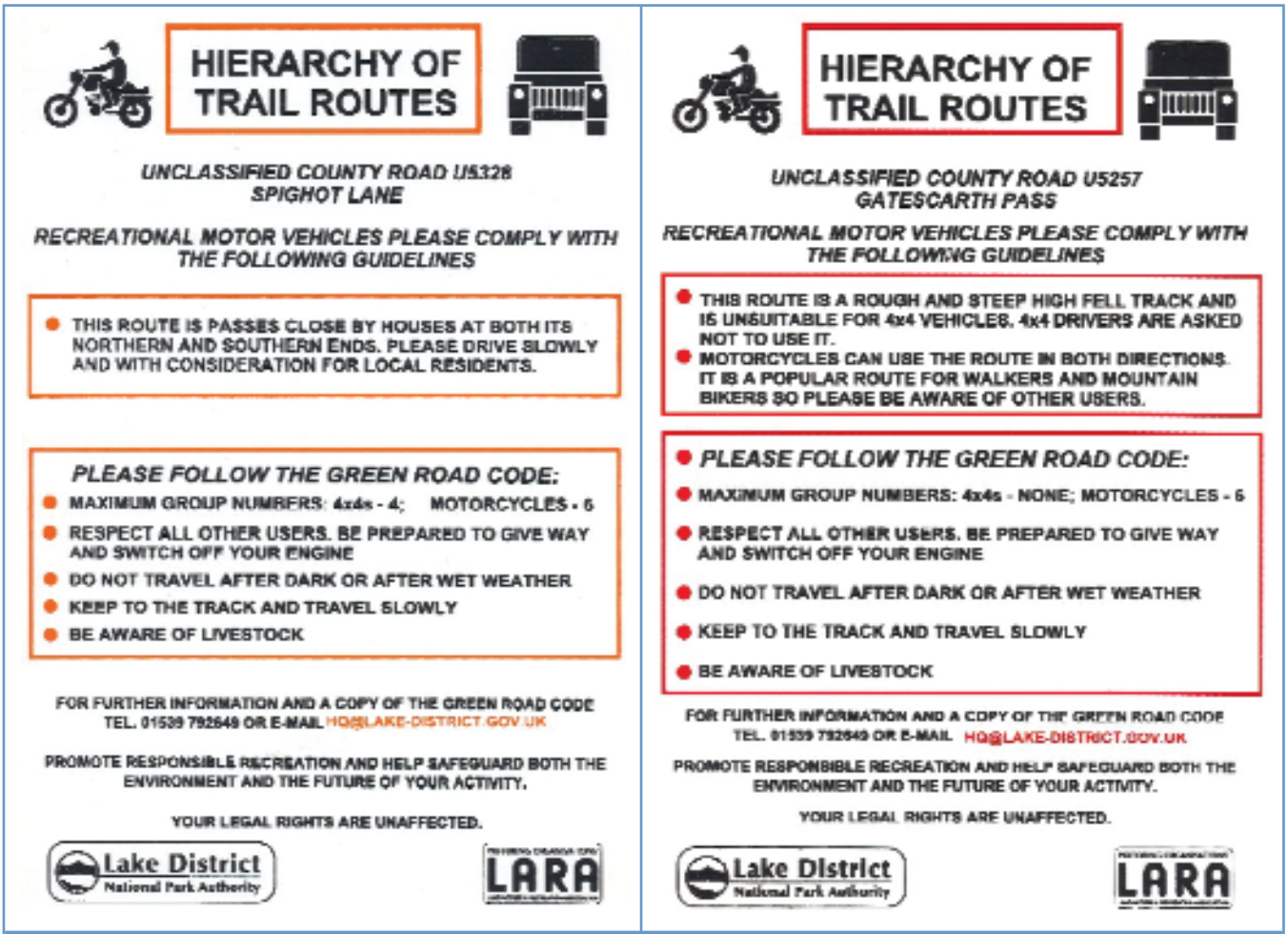
- Condition of route.
- Level of use.
- Likelihood of conflict with other users.
- Proximity to buildings and livestock.

A degree of voluntary restraint was agreed for the each route, according to its classification. An important factor was the joint evaluation and agreement of the degree of restraint for each route in a transparent and agreed manner. The classifications are dynamic and routes can move between categories, based on the most recent evaluation.

Since 2002, routes have been colour coded:

- **Green routes** – have either minimal recorded use, or are considered to be sustainable for recreational driving, or have not been the subject of problems or valid complaints. These routes are inspected annually and are open to all vehicle users following the "Green Road Code" (this code is discussed in more detail in Section 5). These routes do not carry advisory signs.
- **Amber routes** – have moderate use and are more sensitive (for example, they are close to livestock or there are high numbers of other users) or are susceptible to a change in the levels of recreational driving leading to deterioration in the route condition or increased conflicts with other users. These routes are surveyed twice a year. Advisory signs are placed on these routes.
- **Red routes** – have significant use and are popular with other users, have a high number of valid complaints or are in poor condition. These routes are surveyed twice a year. As with amber routes, these routes carry advisory signs.

Advisory signs identify the route clearly, and indicate the nature of its sensitivity, the constraints on recreational drivers and any agreed restraint upon its use. All signs request drivers to follow the Green Road Code, and highlight the need to respect other users, to give way and switch off engines if necessary, not to travel after dark or in the wet, to keep on the track and travel slowly and to be aware of livestock. Contact details for further information are also provided.



Examples of Amber and Red route signs used by the Hierarchy of Trails (reproduced by kind permission of the Lake District National Park Authority)

2.1.4 Code of conduct

The Countryside Agency research [Uzzell, D. et al, 2002] recommended that authorities work with user groups to develop a culture of "thoughtful and tolerant use". A code of conduct, focussing on the rights and responsibilities of all user groups, was considered desirable to support development of this culture.

The Lake District National Park "Green Road Code" aims to promote responsible driving and ensure sustainable use of the Park's unsealed routes. The code was agreed by the Lake District National Park Authority, the local highway authority and mechanically propelled vehicle user groups. In addition to providing information on recreational driving, it includes details on rights of way and the types of rights they carry, voluntary restraint and its importance, and the limitations of maps for identifying routes which carry vehicular rights. It also explains the different classifications of routes in the Lake District National Park, the signage on these routes and the reasons for the classification.

The Code was widely distributed through motoring organisations, local vehicle dealerships and tourist information offices, local petrol stations and garages. Commercial businesses involved in recreational driving were asked to distribute the code to their customers.

2.2 The local rights of way improvement plan

A response to a byway problem needs to complement the local rights of way improvement plan. In addition, the implementation of the rights of way improvement plan needs to ensure that problems are not created on byways where none currently exists.

A trail motorcycle rider on the Roych Road (photograph courtesy of Derbyshire County Council)

2.2.1 Implementing a plan

Actions taken when implementing a rights of way improvement plan to facilitate non-mechanically propelled vehicle use of byways may also increase use by mechanically propelled vehicle users. For example, actions to increase the use of byways by carriage drivers may also increase the number of mechanically propelled vehicle drivers. Without sufficient consideration of this consequence, such actions might result in conflicts between users where none previously existed.

Equally, actions which increase the number of non-mechanically propelled vehicle users on byways currently used by mechanically propelled vehicles without conflict between users, may also increase the number of conflicts and complaints. For example, a byway may be unattractive to horse riders because it crosses a main road and no conflicts between users have been reported. However, installation of a 'Pegasus crossing' on the main road and promotion of the route for horse riding could increase the number of non-mechanically propelled vehicle users and result in conflict and complaints concerning the use of mechanically propelled vehicles.

2.2.2 Future demand

Rights of way improvement plans consider the current and future demands of the public and examine the opportunities provided by the rights of way network. The document "Rights of Way Improvement Plans: Statutory Guidance to Local Highway Authorities in England" [Defra, 2002] recognises that a rights of way improvement plan needs to:

- Account for the use of byways open to all traffic within a rights of way network which provides access for all users;
- Consider how to respond to, and manage, a demand for recreational motoring.

In addition, the statutory guidance for England [Defra, 2002] states that "Wherever possible proposals for improving rights of way should not unduly benefit one class of user at the expense

of another. Improvements that are intended to benefit cyclists, harness-horse drivers, horse riders or walkers should not unduly restrict lawful motorised use of public vehicular rights of way."

The Welsh Assembly Government's "Rights of Way Improvement Plans – Guidance to Local Highway Authorities in Wales" [Welsh Assembly Government, 2002] states that "In making improvements for non-motorised users, authorities shouldn't disadvantage legitimate motorised use." Thus, the needs of land management, recreational and other vehicles need to be considered alongside the other users of these routes.

This statutory guidance for England and Wales establishes that the needs of mechanically propelled vehicle users need to be considered during the preparation of rights of way improvement plans. The rights of way improvement plan should recognise the needs and concerns of vehicle users, as well as other users, and set out actions in response. Only by demonstrating that the needs of all users (including mechanically propelled vehicle users) have been considered will it be possible to ensure the actions proposed in the plan have the support of mechanically propelled vehicle users.

Research conducted for Defra [Defra, 2005] estimated that mechanically propelled vehicle traffic flow on byways open to all traffic is almost always associated with:

- Land management.
- Recreational use.
- Residential use.

This indicates that land owners, recreational drivers and residential users should be consulted when preparing a rights of way improvement plan.

Research into the needs of recreational vehicle users in an area of Nottinghamshire [Evans, R. et al, 2004] concluded that:

- It is important to account for the needs of recreational vehicle users in an holistic manner, so that illegal use does not increase or legitimate use is not displaced into areas managed by other authorities.
- Purpose built facilities warrant consideration but cannot be expected to entirely satisfy the needs of recreational vehicle users although they may meet the needs of younger users and offer an opportunity to educate them in responsible motoring.
- A high proportion of recreational vehicle users are members of organisations or clubs. Thus there are significant opportunities to network with a pool of informed and responsible users.
- There is merit in authorities adopting a positive approach to motor vehicle use, which engages users and wider stakeholder groups.

Data consistently indicate that fewer than 5% of rights of way users are recreational mechanically propelled vehicle users [Countryside Agency, 2001c, ADAS Consulting, 2003b, Sheffield Hallam University, 2004a, Turner, A. et al, 2004]. Despite this low proportion of overall users, authorities should consider the future demand for recreational driving and how such demand might be managed. They should draw up strategies for managing this demand and

avoiding conflicts on byways that are also going to be promoted for walking, horse riding, cycling or carriage driving.

2.2.3 Consulting land owners

Land owners are important stakeholders in byways, as users and as maintainers. Land owners will constitute a small proportion of a general consultation exercise, when compared to the local population and other route users who may be consulted [Sheffield Hallam University, 2004a, Sheffield Hallam University, 2004b]. Several research reports detail methods which have proved effective in consulting land owners [Sheffield Hallam University, 2004a, Sheffield Hallam University, 2004b, Rotherham Streetpride, 2004, Rural Resources, 2004b].

An abandoned and burnt out vehicle on a byway

Of the concerns expressed by land owners during research for local rights of way improvement plans, those which are relevant to increasing the accessibility of byways are:

- Fly-tipping.
- Unauthorised access/unauthorised use of mechanically propelled vehicles.
- Theft.
- Increased workload.
- Blocking of accesses.

2.2.4 The Disability Discrimination Act 1995

In drawing up their rights of way improvement plans, authorities are required to assess the accessibility to blind or partially sighted persons and others with mobility problems (such as users in wheelchairs, those who experience difficulty walking, or those with small children or pushchairs).

Part III of the Disability Discrimination Act 1995 (which came into force in October 2004) gives disabled people rights of access to everyday services that others take for granted. Under the Act, service providers are expected to take reasonable steps to remove, alter or provide reasonable means of avoiding physical features which make it impossible or unreasonably difficult for a disabled person to make use of a service.

The Disability Discrimination Act 2005 ensures that discrimination law covers all the activities of the public sector, including the management and maintenance of the byway network.

2.3 The durability of the byway

The durability of the byway (its ability to withstand the stresses imposed by the weather and by use, including mechanically propelled vehicles) is influenced by its subgrade type, topography, geometry and drainage. To withstand use, the localised high stresses from users (for example, wheels or hooves) must be effectively transmitted and spread over a large area of the underlying ground (subgrade).

A byway in good condition with exposed ground (subgrade) surface

2.3.1 Byway subgrade

Subgrades may be loosely classified into four levels of performance. This classification is primarily based upon the material's resistance to deformation. However, other factors such as local drainage and local topography can result in two similar subgrade materials performing very differently.

Good: Coarse granular soils (gravel and sandy gravel) and rock.

Medium: Sandy clays, sands and low plasticity clays (such as the majority of the boulder clays in northern England).

Poor: Thin peat layers, heavy/high plasticity clays (such as London Clay) and silts.

Very poor: Thick peat deposits.

Geological maps (solid and drift deposit editions) can be used to identify the subgrade in a particular area. These maps are available from the British Geological Survey (www.bgs.ac.uk).

For byways with exposed ground surfaces (that is, without added materials), the subgrade would need to be stiff enough to carry the traffic without deforming significantly. While many soils have these properties when substantially dry (for example, in summer), few have them when wet. A rock subgrade may be structurally capable of carrying all traffic under any weather conditions, although it may be slippery when wet and unsuitable for carrying certain users, such as walkers or horse riders. Some rock types are susceptible to deterioration when wet (for example, chalk or mudstones).

Most upland areas are associated with solid geology, for example, the chalk of the North and South Downs, the igneous and metamorphic rocks of the Lake District and the slate of North Wales. Low lying areas are commonly associated with geologically younger drift deposits, for example, boulder clay, gravels and sands, and peat.

Byways in upland areas are generally on good subgrades that drain rapidly. However, there are exceptions and poorly drained peat deposits in upland areas are well known in, for example, the

Pennines and the Yorkshire Dales. Exposed upland areas are more prone to suffer erosion and scour.

Byways in lowland areas are more likely to be composed of medium, poor or very poor subgrade, again with exceptions such as Quaternary sands and gravels in Cheshire, which are a good subgrade. In general, byways in lowland areas are vulnerable to subgrade deformation under traffic.

Peat is an organic-rich soil subgrade that can have very high moisture content. It is often found in environmentally sensitive areas indicating that advice from the authority's ecologist, and/or from English Nature or the Countryside Council for Wales, should be sought before any works are undertaken.

Rutting of a peat verge next to raised byway surface. The peat is unable to withstand the stresses imposed by the vehicle wheels

Any subgrade is more likely to deform and be less able to spread load when it has high water content (for example, because of wet weather and/or poor drainage). Of all the subgrades most likely to be encountered, clay subgrades are perhaps most susceptible to moisture, changing from being hard and brittle in a dry summer to soft and plastic during a wet winter. Clay subgrade surfaces are prone to cracking after periods of drought. Subsequent rain will quickly penetrate the clay rather than being shed from the byway surface, making the byway vulnerable to deformation. Some types of clay are more susceptible to seasonal water content change than others and local experience of their characteristics is necessary to understanding how they behave as a subgrade material.

Little Budworth Country Park is a lowland heath that has a network of bridleways and byways throughout. The subgrade typically comprises glacial sand. Low lying sections of the track are prone to ponding and leaf litter often prevents the surface from completely drying out during winter months. Mechanically propelled vehicle use along these byways appears to have caused minimal deterioration.

However, the low-lying sections of track are prone to shallow rutting. The shallow ruts then act as a sink for surface water and boggy areas are formed. The bases of the ruts are firm and the byway is of sufficient width to walk around the boggy areas. The material is easily regraded and relatively free draining once the leaf litter is removed.

Source: Cheshire County Council

2.3.2 Byway drainage

Any byway with a gradient along its length will encourage water to drain, minimising the risks of weathering from water retention, but increasing the risks of erosion and scour. The transverse profile of a byway (crossfall) will also affect its ability to drain, with flat surfaces increasing the risk of water ponding and resultant deterioration. Sunken byways, that is, byways which are lower than their surroundings, are generally associated with poor drainage and may be at risk of:

- Erosion and scour on a gradient.
- Water ponding on flat byways.

On byways which are not naturally well drained, ineffective maintenance of man-made drainage will result in byway deterioration. Indications of insufficient drainage are:

- Scouring of materials from the byway surface.
- Waterlogged sections of byway.
- Scour/gullies associated with existing drainage features and poor establishment of vegetation.
- Accumulation of fine material in low lying places after heavy rain.

2.3.3 Byway geometry

Changes in the direction or incline of byways, such as at corners or at the base of slopes, are more likely to deteriorate under traffic because of the stresses imposed at these points, for example, by braking or turning. Similar deterioration can occur where land management vehicles make sharp turns into fields.

Sloping byway surface at a corner because of increased stress at the inside of the curve

Deep ruts because of increased stress at the change from a flat byway to an incline

2.4 The condition of the byway

It is important to assess the condition of the byway when determining appropriate maintenance and repair options. Byway condition surveys provide authorities with current information on condition and on changes over time. Surveys can vary by scale and nature, from those collecting data to specify repair works for an individual byway, to those used to monitor the whole byway network.

The main aim of a survey is to record sufficient information to provide a representation of the byway at a particular time, and the survey should record details such as nature of the byway surface, culverts and drainage features. Digital cameras are particularly effective in supplementing hand written records.

Trail motorcycle riders on a byway (photograph courtesy of the Lake District National Park Authority)

Volunteers from local user groups, parish or community council representatives or residents may be able to help conduct surveys. Surveys carried out jointly by officers and volunteers can ensure that an impartial view is obtained.

Ideally surveys should be carried out twice a year:

- In summer, when traffic and vegetation growth are at their highest.
- Towards the end of winter, when drainage problems and surface damage are most apparent.

Given the long history of many byways it is probable that the type of byway construction will change frequently along its length as a consequence of variations in maintenance and repair solutions applied historically to the byway. With this in mind, it is possible that significant deterioration will have occurred at localised points along the byway where a confluence of factors undermines the byway's ability to resist the stresses applied.

2. Factors to be considered

Survey example

- Name of the parish.
- Name of the byway.
- 6 figure Ordnance Survey grid references of the start and end points.
- Details of land owners.
- Length of byway.
- Width of byway (m):
  - Width of narrow sections
  - Usable width
- Extent and type of waymarking.
- Length and condition of each type of surface:
  - hardcore / gravel
  - other rock / riverbed / sand
  - grass / soil (clay, sand, chalk, peat)
  - other
- Gradients (flat, moderate or steep).
- Evidence of use and frequency of use (in broad terms) by:
  - farm animals tractors and other agricultural vehicles
  - cars or four wheel drive recreational vehicles
  - motorcycles
  - horse drawn carriages
  - horses
  - bicycles
  - walkers
  - other traffic
- Details and location of problems:
  - locked / narrow gates
  - fences
  - cultivation
  - vegetation
  - other
- Estimate of remedial work required:
  - total length of surface vegetation to be cleared
  - total length of overhead vegetation to be cleared
  - total length of ditches and grips to be cleared
  - total length of surface affected by ruts
  - total length of surface affected by deep mud
  - other problems
- Number of signposts and waymarks required.
- Ecological information.
- Historical information.

Source: Hampshire County Council and Entec UK Ltd

The Lake District National Park Authority uses standardised survey sheets and fixed point photography. These surveys record details for each 100 m section of byway. The survey sheet, which has been developed for upland areas, includes points of reference, categories for width of scouring on the ground, categories for depth of scouring, width of worn vegetation, features such as braiding, wheel rutting and gullying, route gradient and loose debris covering adjacent vegetation. Space is left for more subjective comments on other factors, which include drainage. The aim is to collect data on deterioration in a systematic manner to allow objective assessment of the byway network.

Several authorities are implementing structured annual surveys, such as Wiltshire County Council which has a rolling parish-by-parish programme for reviewing the condition of the rights of way network, and Hertfordshire County Council, which aims to carry out routine surveys on 20% of its rights of way network per year.

2.5 The uses of the byway

The uses of the byway will determine the stresses it routinely experiences and are an important factor in assessing appropriate responses to byway problems. For example, a byway with an exposed clay surface used by land management vehicles when harvesting crops may suffer from rutting. Annual regrading of the surface may be a more appropriate response than the addition of a load bearing layer of aggregate material.

Any use which exceeds the byway's ability to resist the imposed stress will cause permanent deformation of the byway, seen as rutting. These uses could include:

- A delivery lorry accessing a dwelling, where the weight of the lorry and the stress at each wheel is sufficient to deform the byway.
- A 4x4 using a byway when wet, although the byway may be able to resist deformation when dry.

The level of use of a byway will vary during the year. Some byways may attract significant traffic during the winter but the majority is likely to be used most intensively between spring and autumn. Horse riders and walkers will use byways all year if the conditions are suitable. Byways that provide access for land management and to dwellings will also be used all year round. In some cases farmers may use tracks more intensively in winter when feed needs to be taken out to livestock.

It is worth noting that a high-stress use may be related to the seasonal condition of the byway, as byways are more vulnerable to deterioration when wet. Therefore, it may be appropriate to restrict the level of use or the applied stresses at particular times of the year. This could be considered as part of the response to a problem once the site specific characteristics of the byway are understood.

Manned traffic surveys can be used to collect data on the use of a byway. They can be time consuming where an authority has a substantial network of byways. Data loggers are an alternative but these are unlikely to be economically viable unless substantial data gathering is needed.

Data loggers are used to monitor mechanically propelled vehicles, predominantly used for recreational driving, as part of the Lake District National Park Authority Hierarchy of Trail Routes. They are used in combination with other survey techniques to relate levels of use to visual condition surveys of the byways.

It is possible to collect evidence of byway use and frequency of use (in broad terms) from visual surveys of the byway surface. However, it is important to recognise that there is likely to be bias in the survey data. For example:

- Hard surfaces do not readily show evidence of users while soft bare earth easily shows the imprint of a tyre, hoof print or footprint.
- Heavy vehicles and animals make a deeper, more distinctive imprint than lighter vehicles or human feet and tend to obliterate evidence of other use.

2.6 Hedgerow and tree protection

The corridors formed by trees and hedgerows lend a special character to byways. Authorities, land owners and volunteers should check with local planning authorities whether any permissions are needed before carrying out work affecting trees and hedgerows along byways. It is prudent to carry written permission when the work is being undertaken.

Local planning authorities administer the Hedgerow Regulations 1997 (Statutory Instrument 1997 No. 1160) which aim to secure the retention of important countryside hedgerows in England and Wales. The Regulations protect hedgerows considered to be important, for example, a boundary hedge to a highway or a hedgerow with priority species as listed in the UK biodiversity action plan. Byways are historical routes, and are defined as highways, so it is prudent to assume that any boundary hedgerows are considered important and are protected until their status is determined.

A byway where the hedgerows have recently been cut back

Tree preservation orders are made by local planning authorities, and in some instances county councils, to protect trees that bring a benefit to their local surroundings. Guidance to assess the value of trees when considering tree preservation orders is given in "Tree preservation orders: a guide to the law and good practice" [Office of the Deputy Prime Minister, 2000]. (Tree preservation orders should not be placed on trees which obstruct highways. Tree preservation orders do not override the duty on authorities to keep highways free from obstructions.)

2.7 The heritage of the byway and its surroundings

Byways may pass across or close to ancient monuments with archaeological value. The byway itself may have historical significance, for example, it may have been surfaced with stone setts during the industrial revolution to facilitate horse drawn traffic. Authorities, land owners and volunteers should check with the local authority archaeologist whether any permissions are needed before carrying out work. It is prudent to carry written permission when the work is being undertaken. The local authority archaeologist will also be able to advise if special provisions are needed protect the heritage of the byway.

Sites which are designated ancient monuments are maintained on the 'schedule of ancient monuments'. The Ancient Monuments and Archaeological Areas Act 1979 protects these sites and 'scheduled monument consent' is required before work can be undertaken. This consent system is administered by the Department for Culture, Media and Sport and English Heritage in England and Cadw in Wales.

There are over 200 classes of ancient monument, ranging from prehistoric standing stones and burial mounds through to collieries and wartime pill boxes. There are 18,300 entries on the current schedule in England (covering approximately 31,000 sites) and 3,400 in Wales.

The Hertfordshire County Council's Rights of Way Guide controls maintenance and repair work in areas of archaeological interest to ensure minimum disturbance to the byway surface and to restrict the removal of topsoil. In addition, the Archaeology Unit is consulted to ensure the acceptability of proposed maintenance or repair works on particular sites.

2.8 Ecological sensitivity associated with the byway

Byways may cross, or be close to, sites of special scientific interest, or other sites protected for ecological reasons. Byways in National Parks or Areas of Outstanding Natural Beauty may warrant particular attention for their ecological and landscape value. Authorities should also be familiar with Defra guidance on "Duties on relevant authorities to have regard to the purposes of National Parks, Areas of Outstanding Natural Beauty and the Norfolk and Suffolk Broads" [Defra 2005]. It is important to find out if protected species or any sensitive nature conservation interests are present on the byway before any work is carried out.

The Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) makes it an offence for any person to intentionally or recklessly destroy or damage any of the special interest features of a site of special scientific interest (knowing it was a site of special scientific interest).

The Countryside Council for Wales and English Nature provide information and maps of protected sites on their web sites (www.ccw.gov.uk and www.english-nature.org.uk) which can help to identify byways with ecological sensitivity. Authorities, land owners and volunteers should check with the local authority ecologist, or English Nature or the Countryside Council for Wales, whether permission is needed before carrying out work on a byway with sensitive ecology. It is prudent to

carry written permission when the work is being undertaken. The local authority ecologist will also be able to advise if special provisions are needed to protect the ecology of the byway.

The Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) places a duty on authorities to take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest in all their functions and decision-making. This includes all activities, whether on or affecting a site of special scientific interest, not just those related to the countryside or rights of way.

The UK biodiversity action plan sets out a broad strategy and targets for conserving and enhancing species and habitats across the UK. Local biodiversity action plans are the means by which the national strategy can be achieved. These local plans can reflect the local biodiversity while accommodating other aspects of local government. Further information on the UK biodiversity action plan, and guidance on local biodiversity action plans can be found on the UK biodiversity action plan web site (www.ukbap.org.uk).

Many authorities have produced their own local biodiversity action plans which should be considered when undertaking maintenance or repair work. There may be particular local features that these authorities are interested in protecting or promoting through the rights of way network.

A geographical information system linked to a database or a stand-alone database are convenient ways of recording information about byways. Hampshire County Council uses a geographical information system containing a digitised version of the definitive map as part of its rights of way management strategy and to ensure that features such as sites of special scientific interest and heritage sites are shown along with rights of way. This is used when maintenance work is being planned.

Hertfordshire Biological Records Centre provides advice on areas of wildlife importance and general ecological advice. They have developed various wildlife and habitat geographic information systems which can be accessed either directly by the rights of way department or through the records centre. The wildlife site coverage includes important conservation sites. The purpose of this coverage is to alert planners and land managers to sites of wildlife importance in the area. In addition to important semi-natural habitats, the system also covers protected species, for example, badger setts and sites with great crested newts.

Source: Hertfordshire County Council's Rights of Way Guide

Under the Countryside and Rights of Way Act 2000, both English Nature and the Countryside Council for Wales have powers to ensure that sites of special scientific interest are protected and managed effectively. This includes the power to apply for a diversion to a right of way (including a way shown on the definitive map as a byway open to all traffic) in order to protect a site of special scientific interest. Where they do, the authority may ask English Nature or the Countryside Council for Wales, as appropriate, to contribute to the costs of the works. The creation of a new right of way through the diversion process does not require the authority to provide a sealed surface.

2.9 Management approach

Discussions with authorities during the preparation of this guide indicate that a key factor influencing the management of byways is the availability of funding, confirming that budgetary constraints will influence the response to byway problems.

The Lake District's Hierarchy of Trails is a management approach adopted in an area with an extensive network of byways. The park has 108 byways (including byways open to all traffic and unsealed unclassified roads), covering over 170 km. The project costs, from April 1999 to April 2000, including the trails management officer, are given in the 2001 review of the Hierarchy of Trail Routes as approximately £68,500 [Robinson, D., and Wilson, G., 2001]. However, these costs do not account for the value of voluntary labour or management input from the participating organisations and individuals.

A lack of funding has led to an historic backlog of maintenance on many byways. The "Wales Rights of Way Condition Survey 2002" [exeGesIS SDM, 2003] records an average of 17 obstacles per 10 km of byway open to all traffic which make the way inconvenient to use or unusable. Typical obstacles are fences and hedges, vegetation, boggy or flooded sections and unbridged watercourses. Data from the "Rights of Way Condition Survey 2000" for England, [Countryside Agency, 2001a] indicate that, per 10 km of byway open to all traffic, there are 1.2 obstacles for walkers which make the way unusable, 2.4 for cyclists, 1.8 for horse riders, 5.9 for carriage drivers and 4.7 for mechanically propelled vehicle users.

The rights of way officers working for Mendip District Council, through an agency agreement with Somerset County Council, have made significant progress in reducing the backlog of work on the rights of way network in the area. Each year they prepare a 'service plan', which identifies the local needs for the coming year. The plan includes development and promotion of trails as well as maintenance and repair needs. The rights of way officers work closely with Mendip District Council's Leisure and Tourism Department to develop leaflets which promote walking routes throughout the area.

Maintenance is scheduled parish by parish, to bring routes up to standard. This approach has been welcomed by the parishes, since the system is transparent. The rights of way officers also maintain good contacts within the parishes, which are often the first source of information in identifying maintenance requirements. The planned approach enables Mendip's rights of way officers to negotiate access with land owners significantly well in advance of works taking place.

Although user safety is always the primary concern, assessing budget priorities can also account for the importance of the route to the rights of way network. This approach is designed to allocate the funding available where the rights of way network users will accrue the most benefit.

2. Factors to be considered

Somerset County Council, in developing a maintenance policy and its rights of way improvement plan, is considering including the following maintenance priorities:

1. Amenity routes – rights of way which link amenities and are used regularly by the local community. These routes are important throughout the year.
2. Promoted routes – rights of way which form part of an integrated network for recreational activities. These routes are more likely to be used at weekends or a seasonally.
3. Little used routes – rights of way which are not used frequently by local people or recreational users and which add little benefit to the rights of way network.

Suffolk County Council acknowledges that maintenance works are often reactive rather than programmed, the maintenance needs identified from the knowledge and experience of their rights of way officers and by notification from district and parish councils and users. Works for safety reasons are given priority. For other routes, factors such as the volume of complaints and the benefit to the network are used to target resources. Hence, other maintenance works are prioritised on the basis of the following:

1. Well used popular routes, particularly promoted routes.
2. Bridleways not included in (1).
3. Low use routes.

Where byways are used for land management or residential access, the land owner or residents may well conduct minor repairs. This may involve filling holes, clearing vegetation and removing obstructions. Land owners have a legal responsibility to ensure that byways are kept free from overhanging vegetation and are not obstructed in any other way by their activities. The Highways Act 1980 allows an authority to recover, from the persons causing the damage, any extra expense of maintaining the highway which results from damage caused to a publicly repairable way by traffic that is extraordinary (for example, excessive weight).

Land management vehicles applying high stresses at each wheel can place significant demands on field access routes (which can include byways). Some areas are relatively dependent on single crop types, such as sugar beet in parts of Suffolk and maize in Cheshire, which are harvested during the winter. The combination of concentrated use during wet seasons and the physical characteristics of the byways can lead to localised surface damage.

Voluntary negotiated agreements between land owners and authorities can often be used as a remedy, as it is in the land owners' interests to keep their access points open. Where goodwill has failed, Cheshire County Council has served enforcement notices on land owners to repair a byway surface so that it is suitable for all user groups.

2.10 Monitoring and review

Monitoring and review are required to analyse the effectiveness of a response to a byway problem. This can include condition and traffic surveys, and monitoring of the number of complaints or conflict incidents on a byway.

The Lake District's Hierarchy of Trail Routes uses a variety of means to monitor recreational motor vehicle driving in the National Park. A "Green Road Activity Register" is used to log driving activity, including notifications by recreational drivers before and after use, and to register complaints. The complaints are reviewed at the bi-annual meeting of vehicle users and at Trail Management Advisory Group meetings and, where necessary and possible, action is taken. The register allows the authority to assess which routes are being used for recreational driving, where complaints occur, and the nature of those complaints. National Park officers maintain regular contact with recreational driving user group representatives so that complaints can be acted on without delay if possible. This process has provided an important mechanism for the officers to deal with complaints and maintains the principle that recreational drivers must be part of the solution to problems.

Consistent, objective data collected at each condition survey are used to instigate pro-active management measures. Green routes are surveyed annually, amber and red routes twice a year.

Electronic data loggers, which record the date and time of each mechanically propelled vehicle that passes, have been used to monitor 20 routes over the last 3 years, including routes with voluntary restraint and traffic regulation orders in place. The authority now has a 36-month continuous record of these data.

All the data are then fed into a decision-making process allowing informed management and maintenance options to be put into place. Using the good quality and objective data collected, decisions to seek voluntary restraint or traffic regulation orders are taken jointly with users and have been found to be supported by recreational drivers and effective. Good quality data enable discrimination between fact and perception and a transparent project-based management programme means that the full benefit of data being fed into decision-making processes is realised.

The "Nidderdale Area of Outstanding Natural Beauty Management Plan 2004 – 2009" includes an action to identify areas where problems with recreational vehicles occur, to monitor the incidence of these problems and to establish baseline data. The desired outcome is a better understanding of the scale and location of problems [Nidderdale Area of Outstanding Natural Beauty, 2004].

3. Solution choices

This guide identifies three generic categories of solutions to resolve problems on byways although in many cases a combination of these options will be required:

- Restraint – Voluntary restraint and traffic regulation orders.
- Maintenance – Maintenance of drainage, the surface and vegetation.
- Repair – Repair of the byway through drainage and construction works.

3.1 Voluntary restraint

Voluntary restraint is one of the suite of management tools used by the Lake District's Hierarchy of Trail Routes which places a reliance on partnership and co-operation. In 2004, there were 45 trail routes in the hierarchy on which individual voluntary restraint is applied over and above that contained in the Green Road Code (mentioned previously).

Discussions with authorities when the drafting this guide indicate that voluntary restraint is widely seen as ineffective in managing mechanically propelled vehicle use of byways. Irresponsible drivers will ignore voluntary restraint notices and continue to drive on byways that can no longer sustain mechanically propelled vehicles. The 2001 review of the Hierarchy of Trail Routes [Robinson, D., and Wilson, G., 2001] concluded that voluntary restraint was effective in reducing, but not eliminating, unsustainable use.

A voluntary restraint notice from Surrey County Council on Wolvens/Crockers Lane

This indicates that voluntary restraint can be a useful tool for management of byways where reductions in mechanically propelled vehicle traffic is desirable, but not where the prohibition of mechanically propelled vehicles is agreed to be necessary.

The 2001 review of the Hierarchy of Trail Routes acknowledged that voluntary restraint on Gatescarth Pass reduced recreational driving on the route (possibly because the reasons for the restraint were clear) but that it had not been eliminated. However, the review also reported that members of the Trails Management Advisory Group, including vehicular users, agreed that the byway required stricter regulation than was possible by voluntary restraint alone [Robinson, D., and Wilson, G., 2001].

3.2 Traffic regulation orders

The Road Traffic Regulation Act 1984 enables authorities to restrict, prohibit or regulate the use of highways (including rights of way) through the making of traffic regulation orders. Traffic regulation orders can be permanent, temporary or experimental. They can apply all year round or, at specific times of the year. Although traffic regulation orders can be applied to all classes of way and most classes of user, they cannot be used to prevent access to premises by pedestrians. A traffic regulation order does not alter the status of the highway to which it is applied.

A sign on a footpath showing that mechanically propelled vehicles are not allowed along the way. Although not intrusive in the rural environment, this sign could not be used to sign a byway subject to a traffic regulation order prohibiting mechanically propelled traffic because it does not comply with the Traffic Sign Regulations.

Traffic regulation orders are most commonly applied to manage traffic on sealed roads, for example, making parking restrictions, arranging one way streets or enabling maintenance works. Traffic regulation orders are enforceable only if they are signed in accordance with the Traffic Sign Regulations (Statutory Instrument 2002 No. 3113), even in rural or other settings where the use of such signs could be considered inappropriate.

Permanent traffic regulation orders need to be supported by evidence that the order will achieve one (or more) of the following outcomes:

- Avoid danger to persons or other traffic using the road.
- Prevent damage to the road or any building on or near the road.
- Facilitate the passage of any kind of traffic (including pedestrians).
- Prevent unsuitable use by vehicular traffic.
- Preserve the character of the road in the case where it is particularly suitable for use on horseback or on foot, or preserve or improve the amenities of the area through which a road runs.
- Conserve or enhance the natural beauty of an area. This includes conserving flora and fauna, and geological or physiographical features.

To make a permanent traffic regulation order, the authority must follow the statutory procedure set out in the Local Authorities' Traffic Orders (Procedure) (England and Wales) Regulations 1996 (Statutory Instrument 1996 No. 2489).

3. Solution choices

Experimental traffic regulation orders are used in situations that call for monitoring and reviewing, such as monitoring byway condition to evaluate the cause of deterioration. These orders last no more than eighteen months before they are abandoned, amended or made permanent.

Temporary traffic regulation orders are used if the authority is satisfied of the need because:

- Works are being executed (or are being proposed) on or near the way.
- There is a likelihood of danger to the public or serious damage to the way.
- It is necessary to clear the way of litter or debris.

The procedure to make a temporary traffic regulation order is given in the Road Traffic (Temporary Restrictions) Procedure Regulations 1992 (Statutory Instrument 1992 No. 1215).

When an application for a traffic regulation order is based on objective information, it is more likely to be understood and accepted by the recreational driving community and other users, and less likely to perpetuate adversarial stances.

The experience of the Lake District National Park Authority indicates that traffic regulation orders can be applied more readily where there is common agreement between stakeholders that they are required, and that such agreement can be reached where the need is clearly identified. The authority currently has two traffic regulation orders in place on byways, and a further two are being considered.

The Lake District's Hierarchy of Trail Routes has developed a transparent and dynamic system for assessing the "sustainability" of a route for recreational driving. This system assesses the route condition (irrespective of whether the condition is a result of an historical lack of maintenance or vehicle use), the levels of use and potential for conflict between users, and special sensitivities (such as the presence of sensitive ecology). The system, applied equally to all byways throughout the park, also provides a level of detail and clarity to route users. This systematic approach of route evaluation, and the desirability of restriction, has been developed with the support of local recreational driving groups.

The Yorkshire Dales National Park Authority has reported on the effectiveness of experimental traffic regulation orders as a management tool for green lanes in the Yorkshire Dales National Park [2005].

Adopting a common programme for byway evaluation can enable all parties to appreciate maintenance and management needs and ultimately the need for traffic regulation orders. Such a system could be modelled on the Lake District's Hierarchy of Trail Routes, and adapted to suit local circumstances. The assessment could include:

- Current surface condition.
- The risk of deterioration from the use of mechanically propelled vehicles because of the route situation (such as local geology, topography).
- Numbers of mechanically propelled vehicles using the byway.

- Numbers of other user groups using the byway.
- The importance of the byway to mechanically propelled vehicle users.
- The importance of the byway for access and land management vehicles.
- The importance of the byway to the other user groups.
- The availability of safe alternative routes for users.
- The importance of the byway to the implementation of the rights of way improvement plan.
- The proximity of the byway to areas of conservation interest, such as sites of special scientific interest or areas with species relevant to the biodiversity action plan.
- The levels of complaints or problems currently experienced (this could include complaints related to mechanically propelled vehicles, or problems such as fly-tipping).
- Consideration of whether a traffic regulation order would unfairly penalise recreational drivers (for example, if the complaints are related to fly-tipping or criminal activities).

Anecdotal evidence collected during the drafting of this guide suggests that, in some instances, the making of traffic regulation orders may be outside the responsibilities of rights of way officers, and dealt with by a different department within the same authority. Where traffic regulation orders are administered by a highway engineer, who may be more used to applying the process to urban roads, consultation may not include byway users or even rights of way officers. This approach is likely to promote resistance to the traffic regulation order and foster antipathy towards the local rights of way officers.

Liaison between rights of way officers and other authority officers is vital when traffic regulation orders for byways are under consideration. Any policy related to the use of mechanically propelled vehicles in the countryside should include consultation with recreational driving and other user groups. If these contacts are not known, the consultation should be sent to the head office of representative organisations which can distribute the information to relevant members. Contact details for national organisations which should be contacted are given at the end of this guide.

Gatescarth Pass in the Lake District National Park is subject to a traffic regulation order, agreed to be necessary by the stakeholders involved. The order was drawn up on the basis of data gathered about the effects of use. The route is opened on particular days to mechanically propelled vehicle users who have applied for permits. It is closed to 4x4 vehicles between December and March. Horse riders are issued with a monthly permit and are given the combination to a lock used on a gate on the route. The combination is changed each month. The vehicular and equestrian permit systems are administered by the National Park Authority.

Permitted 4x4 vehicles on Gatescarth Pass (photograph of courtesy of the Lake District National Park Authority)

The 2001 review of the Hierarchy of Trail Routes acknowledged that both voluntary restraint and traffic regulation orders are only partially successful unless enforcement measures are in place [Robinson, D., and Wilson, G., 2001]. Without enforcement the traffic regulation order may have little effect on preventing irresponsible use.

The Government has published guidance, Regulating the use of motor vehicles on public rights of way and off road (2005), on enforcement to deal with illegal or irresponsible use. Recreational driving organisations and clubs have indicated they would welcome an increased police presence or profile to ensure that only responsible and lawful drivers access the byway network. Enforcement could include a police presence, but is more likely to include physical barriers to control access by mechanically propelled vehicles.

Barriers should be in keeping with the local surroundings and must not exclude users who continue to have a right to use the route, such as horse riders, cyclists, walkers, wheelchair users and residents with private access rights. The costs of a permit system for some users (such as horse riders, carriage drivers and recreational drivers) should be balanced against the costs of route maintenance or repair to accommodate use by mechanically propelled vehicles if the byway is not capable of carrying mechanically propelled vehicles.

If barriers are unsuitable as they are not in keeping with the local area, it may be worth reconsidering the likely effectiveness of a traffic regulation order, particularly if there is no policing strategy.

3.3 Maintenance and repair: selecting solutions

This section of the guide is intended to provide information to help in identifying the types of distress found on byway surfaces, the underlying engineering causes of the distress, and the maintenance or repair solutions which are appropriate for the distress. (Distress is the visible symptom of byway deterioration.) Information sheets for identifying distress are at the end of this guide.

There is an understandable tendency to apply some kind of ‘standard maintenance and repair’ solution to byways, irrespective of its potential for successfully treating the actual, rather than the imagined, deterioration. The selection of an appropriate maintenance or repair solution for byway distress will only be possible once all the relevant factors have been considered. For example, it may be appropriate to do nothing to a byway which is in an ecologically sensitive environment, even though the byway is in poor condition. In many instances, a combination of options will be required. For example, regrading the surface to provide a crossfall will encourage the byway to shed water while drainage maintenance will help the byway dry out after rainfall.

The costs of byway maintenance and repair vary significantly, depending on:

- Location of the byway.
- Accessibility to construction vehicles.
- Materials used.
- The availability of volunteer work groups.
- Scale of the works.

Use of Silkmoor Lane Clay Track, after a very wet autumn in 2002, led to significant deterioration of the byway's surface. The surface was protected from further deterioration by a traffic regulation order. Initial reconstruction work involved cleaning out the longitudinal drainage ditches and reprofiling the track. A rounded camber was created to promote preferential use down the centre of the track rather than the edge. Use of the edge could have resulted in damage to the drainage ditch. The byway was left for 6 months to dry out after which resurfacing work was undertaken. The repairs to the 500 metres of byway cost between £20,000 and £25,000. Both ends were left quite rough to discourage illegal use and fly-tipping.

Source: Surrey County Council

Silkmoor Lane following repair

3. Solution choices

Table 1 indicates the relative costs of different byway maintenance and repair solutions. In general, lower cost maintenance measures offer greater benefit to the byway per pound spent. However, there are circumstances where additional capital expenditure will reduce future maintenance costs, or where a large programme of low cost measures, forming part of a continuous maintenance scheme, will prevent the byway deteriorating to a level where there would be a significant increase in capital costs for repair.

Table 1: Relative costs of byway maintenance and repair solutions

Increasing cost

Solution	Notes
Clear vegetation	Clearing vegetation keeps the byway free of obstructions and helps the byway surface to dry out. It allows users to use the full width of the byway.
Maintain drainage	Maintaining existing drainage is a cost effective method of keeping byways dry.
Infill surface defects	Infilling areas of distress will not always prevent the distress reoccurring. The use of durable materials (for example, angular hard aggregates) extends the life of infilled areas.
Regrade/reprofile the byway surface	The regrading of surfaces is a cost effective method of maintaining a byway surface, removing ruts which may act as drainage channels, and introducing a surface profile which sheds water. Reprofiling with new materials is more expensive but may be necessary if surface erosion is occurring.
Add drainage	Where there is insufficient or no drainage, drainage schemes may minimise the costs of routine maintenance.
Improve existing byway surface	Where excess water is not the primary reason for byway deterioration (where the surface is, for example, exposed aggregate on a steep slope) other improvement options such as in situ stabilisation with cement may be necessary.
Overlay the existing byway surface	Geotextiles can be used as part of byway construction to reduce the need for imported materials and/or increase the durability of the new construction.
Widening	Construction works that extend the byway into the margins may be required on byways popular with users and where edge loss has occurred.
Excavate and replace the byway	Total reconstruction of a byway is expensive. When excavation and replacement is the only option, the underlying causes of byway distress must be fully understood and accounted for in the design of the reconstructed byway.

Table 2 explains the circumstances under which the different types of byway distress are found. Information sheets, which provide details of the types of distress and their appropriate maintenance and repair and possible restraint solutions, are at the end of this guide.

A byway may consist of up to three generic layers:

- Subgrade layer – natural ground, such as soil, gravel, rock, clay or peat, present on all byways but not always at the surface.
- Structural layer – material, such as crushed stone or recycled asphalt planings, designed to spread loads over the subgrade without deforming itself.
- Surfacing – material, such as sand, quarry fines or top soil, designed to provide a surface suitable for users.

Table 2: Byway distress

Overview	Byway circumstances	Information sheet number	Distress type
Distress associated only with types of byway construction	Byways with surfacing or structural layers	1	Structural layer rutting
		2	Subgrade bearing failure
		3	Inadequate compaction
		4	Pot holes
		5	Corrugation
	Byways with subgrade surface	6	Bearing failure of subgrade surface
Distress associated with particular byway features	Raised carriageway	7	Edge loss
	Gradients and adjacent to water courses	8	Surface erosion
	Areas associated with flowing water	9	Scour
	Local low lying areas	10	Ponding
General types of distress	Concentrations of animal traffic	11	Poaching
	Vegetation growth	12	Encroaching vegetation

Historically, short sections of byways have been sealed with asphalt surfacing (possibly using up excess material from other works). Subsequent repairs to potholes in these short sections of sealed surface are usually (depending on the nature of the byway) of unbound material, to recover the overall unsealed nature of the byway.

Source: Telford and Wrekin Borough Council

Land owners tend to maintain the byways they use to a level suitable for their vehicles (typically tractors). This often means that the way is not easily traversed by other users. Cases of brick rubble being used as an unsurfaced fill material are known. If not from a quality controlled source, this material may be unsuitable, as it may contain metal, glass and other materials which make it especially hazardous to walkers and horses.

Source: Hampshire County Council

Land owners often maintain sections of the network where it benefits them (sometimes with the Council providing the materials). Some land owners take on responsibility for maintenance when byways have been upgraded (for example, where they form an access route to a farm business). This can involve laying a sealed surface. The Council makes site specific assessments (which include taking into account the nature of the byway and the impact of upgrading the byway) and makes the land owners aware of their responsibilities for byway maintenance.

Source: Wiltshire County Council

3.4 Maintenance and repair: material selection

In selecting materials for the maintenance and repair of byways, materials which match the local conditions should be used. In particular, consideration should be given to the pH of the area. For example, it is damaging to use calcareous materials on acidic heathland sites. Leaching from recycled aggregates and other construction materials can be a cause for concern (for example, cadmium and chromium are found in some slags, and lead is found in some limestones). Most construction materials, as they weather and as water runs over or through them, will liberate soluble fractions. Expert advice should be sought if there is any doubt over the suitability of a material, whether from recycled or primary sources. Advice should be sought from the local authority ecologist, English Nature, the Countryside Council for Wales or the Environment Agency, as appropriate.

Much of the material used in byway construction is, in practice, selected from material types available for the construction of conventional highways. There are good reasons for so doing:

- The material can be procured using a well-defined specification that has been refined by much experience. Poorly performing material should thereby be excluded.
- There is widespread experience using these materials so designers and constructors know how to use them successfully.
- When byway works are undertaken by highway contractors, who may not have significant local knowledge, then a commonly understood material ‘catalogue’ is very important.

However, these materials are principally suitable for sealed highways and may have drawbacks for use on unsealed byways. For example, they may be over-specified in terms of the performance required for a byway. They are normally delivered by construction plant that may be inappropriate or impossible to use on the byway. (Indeed, such plant might be the heaviest traffic ever to be used on the byway, thereby necessitating a design just to permit construction or maintenance).

There may be local materials whose 'non-highway specification' characteristics do not preclude successful performance. While these local materials may cost more than highway specification materials, material costs are a minor part of the total costs of the byway repair project (which includes, for example, plant hire and labour). The additional costs of materials may not be significant when compared to these total costs.

In many ways, the arguments for and against choosing highway specification materials are arguments against and for accepting the risk of unsatisfactory performance, at greater and lesser initial cost. Given the service level expectation attached to a byway, a greater level of risk in the materials used, than would be acceptable for a major highway may be acceptable to authorities.

3.4.1 Material sources

The most common material used for byway construction is crushed aggregate. In most circumstances, "6F1 capping" or "Type 2 sub-base" granular materials, defined in Volume 1 of the Highways Agency's Manual of Contract Documents for Highway Works, [Highways Agency, 1998a, Highways Agency, 1998b] is appropriate for byway structural layers, but where it is important that the material is able to drain easily, then "6F2 capping" [Highways Agency, 1998a] or "Type 3 (open graded) sub-base" [Highways Agency, 1998b] or a customised, coarse-graded, material may be preferred.

Almost all of the materials which meet these specifications come from rock quarries or gravel pits, although materials which meet these specifications and which come from recycled sources are increasingly available. However, anecdotal evidence suggests that material used in byway maintenance and repair includes aggregates taken from adjoining land (also known as borrow-pits). Advice on this type of mineral extraction should be sought from the local minerals planning authority (unitary authorities, National Park authorities and county councils). An introduction to minerals planning is given in "Minerals Planning Guidance 1: General Considerations" [Office of the Deputy Prime Minister, 2004b] available from the web sites of the Office of the Deputy Prime Minister (www.odpm.gov.uk) and the British Geological Survey (www.bgs.ac.uk).

3.4.2 Use of recycled materials

The Environment Agency considers (as a starting point) that waste which is recycled as aggregate/construction material (such as crushed concrete or asphalt planings) will cease to be waste only when it is incorporated into a structure such as a road or building, even if it has been through a recovery process such as crushing or screening. This means that where such materials are used for the maintenance of byways, they could be considered to be a waste when being transported to and handled on the byway and subject to the waste management licensing system.

However, the "The Quality Protocol – for the production of aggregates from inert waste" [Waste and Resources Action Programme, 2004] sets out a quality production regime (called factory production control) for reprocessing of materials, after which the material is "probably" no longer a waste. The implication of the "Quality Protocol", jointly produced by the Waste and Resources Action Programme, the Environment Agency, the Highways Agency and the Quarry Products Association, is that unless a material has been through such a quality production regime it should be considered to be a waste and subject to waste management licensing. The "Quality Protocol" is available from the Waste and Resources Action Programme web site (www.wrap.org.uk).

Where an authority proposes to repair a byway with a material which has not been through a factory production control process (for example, the direct use of asphalt which has been excavated from a nearby road) it can apply for a waste management licensing exemption for the site where the materials are to be used. Recycling and reclamation of materials are generally seen as low risk waste management activities (in terms of their risk to the environment and to human health) and are usually exempted from waste management licensing. In England and Wales, exemptions are obtained from the Environment Agency.

Before and after resurfacing of a byway using asphalt planings (photographs courtesy of Wiltshire County Council)

Several authorities have used recycled asphalt planings during byway works. The overall assessment of their mechanical performance appears to be positive. However, some authorities are concerned about the aesthetics of using such a material without a surfacing layer, while other authorities are happy with its surface appearance following weathering and subsequent "greening" over.

Other experience indicates that, if the material is compacted so that it does not provide a trip hazard (that is, almost to the standard of an asphalt surface), then the byway surface falls below acceptable aesthetic standards. Recycled asphalt planings by their nature are variable, and this could explain the lack of agreement on their use as a material in rights of way maintenance programmes.

Asphalt's common name, 'tarmac', may lead some stakeholders to believe that the use of recycled asphalt planings is, by definition, hazardous. However, modern asphalt is made with bitumen rather than tar. Bitumen is inert whereas tar products are classified as hazardous waste. This means that asphalt planings from modern road constructions are inert waste. It is possible that some road planings, particularly when they are from the full depth reconstruction of old road, may contain tar products, so the provenance of all material should be established before it is used (by laboratory testing if records are unavailable).

Recycled asphalt surfacing which is beginning to 'green over'.

Demolition debris may also be available in a crushed state for use as recycled aggregate on byways. If this is considered, preference should be given to crushed concrete or crushed high quality bricks. Many bricks intended for indoor use will quickly break down under trafficking and frost effects. Demolition debris should be accepted only if it is free from glass. Bricks should be largely free of plaster, as plaster will generate excess fine material which could leach sulphates into controlled waters.

Recycled and secondary aggregates should be produced using a quality control regime. Purchasing aggregates from a reputable supplier, with a quality control regime in place, increases confidence in the materials; as their composition and characteristics should be understood, and they can be accepted without further testing. The "AggRegain" web site has further information on many alternative aggregate materials and their suppliers (www.aggregain.org.uk).

The Humber Estuary track is a byway frequently used by cars to access a local viewpoint. The main maintenance requirement is the infilling of potholes. Recycled asphalt planings are used in some sections of the byway as a readily available low cost infill material. This type of maintenance is considered to be in accordance with the local surroundings and the byway use. The recycled asphalt planings behave like a friable/unbound material (that is, they act as a primary aggregate crushed rock and do not create a sealed surface).

Source: North Lincolnshire Council

Hampshire County Council has historically used durable aggregates to replace inferior but readily available local resources. Hard chalk, crushed recycled concrete and locally derived hoggin (as dug granular materials with/without clay) are noted to compact well and support fairly rapid "greening". The use of scalpings (material with significant clay fines content) and recycled asphalt planings is generally prohibited.

Wiltshire County Council has undertaken small-scale trials with quarry waste (flint and chalk) sourced from a local cement works as an aggregate on byways and regularly uses recycled asphalt planings during maintenance works.

The Lake District National Park Authority has a policy to not introduce foreign material onto the higher fells. Therefore, geotextiles, aggregates and cement are not used. Locally derived aggregate has occasionally been used along some of the valley routes.

Neath Port Talbot County Borough Council notes the historic use of blastfurnace slag as an aggregate during the 1980s. However, current policy is to use only locally derived natural aggregate.

Cheshire County Council has trialled various sources of aggregates, including gritstone, sandstone recycled building materials (which are then blinded with finer material), recycled asphalt planings and local sources of industrial spoil such as ash. Environmental assessments were undertaken on each material and uses are tightly controlled by the minimum requirement of being clean and having an appropriate pH for the surrounding conditions.

3.4.3 Durability

Conventional highway specification materials, including recycled materials meeting the specification, come with some assurance of durability as a consequence of the specification to which they have been prepared. The durability of non-specification materials will depend on their composition. For example, asphalt planings and crushed concrete should give acceptable durability, but some materials (for example, furnace bottom ash) should not be exposed to weather and direct trafficking (but may be suitable in lower construction layers). When using non-specification materials, authorities must rely on their experience of local materials to ensure that the required performance is achieved.

Materials that are borderline in terms of resistance to fragmentation may perform adequately in combination with other techniques and factors. An example is the use of local oolitic limestone aggregate as a surfacing material. (It has primarily been used on bridleways.) This has proved highly satisfactory as the material, although relatively weak compared to harder limestone, has some cementitious properties which improve durability without imposing a rigid surface unsuitable for horses. Additional support, in terms of separation from the underlying natural ground is provided by the use of a geotextile material. (Photograph courtesy of Mendip District Council).

Source: Mendip District Council

Several kinds of durability are of concern, including the material's resistance to trafficking or compaction. The Los Angeles test is the preferred British and European Standards test of an aggregate's ability to resist trafficking [British Standards Institution, 1998a]. This test has superseded the ten percent fines value test used in previous British Standards. Higher Los Angeles values indicate lower resistance to fragmentation. A maximum Los Angeles value of 60 is likely to give adequate durability against traffic on byways or compaction-induced aggregate deterioration. This is the requirement of "6F1 capping" materials [Highways Agency, 1998a], which are used to provide a working platform for construction traffic during road construction.

Given the exposed nature of most aggregate used in byways, damage can be caused by wetting and drying or freezing and thawing. Aggregates that are prone to fragmentation (such as mudstone or chalk) are susceptible to these forms of weathering. The swelling and shrinking of the aggregate with wetting and drying causes vulnerable aggregates to break apart, as does the volumetric expansion of freezing water. The magnesium sulphate test is used to assess an aggregate's resistance to wetting and drying or freezing and thawing [British Standards Institution, 1998b]. A maximum value of 35 should provide a suitable aggregate for byway surfacings. This is the requirement for a "Type 1 sub-base" material [Highways Agency, 1998b], which must be resistant to wetting and drying, and freezing and thawing, to protect the integrity of a road.

Frost loosening occurs if the byway is wet and then freezes. The water between the layer particles expands on freezing forcing the particles apart. When the water thaws and drains, the aggregate particles remain in a loosened state. For most byways in England and Wales frost loosening is not a major concern. However, for byways in high, exposed localities (for example, the Pennines, North Wales and the Lake District) this type of weathering may be more common. Frost loosening does not damage the aggregate material, and loosened material on byways will often be re compacted under traffic.

3.5 Maintenance: vegetation encroachment

Encroachment of vegetation is primarily a concern where woodland, shrubs and hedgerows enclose byways. Local conditions such as climate, aspect, geography, level and type of usage, and degree of exposure to wind and sun will tend to dictate maintenance requirements. The primary reason for vegetation clearance is to allow the passage of users. The British Horse Society recommends removing overhanging vegetation to a height of 3.7 metres. When the definitive map and statement shows that the byway is narrower than 3 metres the full width of the byway should be cleared. For other byways, minimum clearance should be to a width of 3 metres but full clearance is recommended. Maximising the width of the byway provides more room for users and spreads the stresses they impose over the byway rather than concentrating it in the centre of the way.

Sufficient headroom available to horse riders only in the centre of a byway can lead to a concentration of use which leads to surface deterioration and the formation of a central channel. Other factors, such as lack of cart or vehicle use and limited byway widths can also influence the concentration of surface deterioration.

Source: Cheshire County Council

Vegetation clearance may encourage species diversity. Byways are often of ancient origin and provide unique wildlife habitats. They may provide a rare mix of dense to light shade, open gaps, steep to gentle banks and shelter from wind and agricultural spray drift. They may provide corridors along which butterflies, other insects and small animals can move (east to west aligned byways are potentially of most value). Flora are more varied than on adjoining agricultural land but may depend on sufficient light for their survival. Most plant and insect species thrive best in a mixture of light and shade. However, some species may be harmed by the clearance of vegetation, for example by removing cover which protects them. If in doubt consult the local authority ecologist and/or English Nature or the Countryside Council for Wales.

It should be noted that tree roots are one of the best means of drawing water out of clays. Evapotranspiration rates at times of significant leaf coverage typically exceed surface evaporation rates. This indicates that clearing overhanging branches may not always be the most effective means to reduce the water content of byways. For byways on clay subgrades, the condition of the byway should be monitored both with and without leaf coverage on surrounding vegetation. If the byway remains wet during periods of leaf coverage, overhanging branches should be removed to allow air and sun to reach the byway. If this does not dry the byway, then clearance or improvement of drainage may be required.

It is important that the byway is left clear and tidy upon completion of the works and that all ditches and watercourses are kept clear of cut vegetation so that other maintenance problems (such as blocked drains) are avoided.

The planting of trees by volunteers as delineation along byway boundaries and around fly tipping bunds (primarily to prevent vehicles wandering off byways) was found to be a long term success when used to infill gaps between wooden bollards (which had been removed or damaged).

Source: Surrey County Council

3.6 Maintenance: drainage

Drainage ditches should be cleared, drainage pipes unblocked and silt traps and soakaways emptied. Any cleared material (for example, organic soft silt) should not be placed on the byway surface. Care should be taken during clearance of drainage ditches to ensure that their profile is not significantly altered. In addition, the stabilising effects of vegetation to the sides of open ditches should not be forgotten as excessive removal during clearance work could lead to further problems.

Common practice associated with the maintenance and construction of drainage ditches through peaty upland areas is the placement of excavated clods of peat along the base of the drainage ditch. The fibrous nature of the peat results in reduced water flow and provides scour protection to the base of the ditch.

Source: Lake District National Park Authority

European protected species, for example, smooth snakes, have been known to use French drains in the New Forest. Caution should be exercised when maintaining such structures and a licence to disturb such protected species may be required.

3.7 Maintenance: byway surface

Small potholes or ruts in the surfaces of byways can be infilled with new material. This material should be sympathetic to the existing byway surface and its adjacent land. Mixing infill materials with cement increases their durability but this may not be in keeping with the surface of the byway. Cement will increase the pH of infill materials and should not be used in sensitive environments.

Compaction after placement will normally be by hand and it is likely that the infill material will further compact under traffic loading. Infill material should be placed slightly proud of the byway surface to ensure sufficient material is present to minimise the potential for water ponding and recurrence of the potholes.

A repair to a pothole on a byway, left proud of the existing surface to allow for compaction under traffic.

Regrading and reprofiling are essentially the same technique, except that regrading uses the material at the byway surface (for example, raking a sand surfacing to remove ruts) and reprofiling imports materials to the site (for example, bringing sand to the byway and raking it into position). Reprofiling is also used to provide crossfall of byways and improve surface drainage.

Regrading includes the routine harrowing and compaction by rollers of byways with exposed subgrade surfaces. This type of maintenance can use hand held rotavators and rollers when small sections of byway are regraded, or attachments on land management equipment for longer lengths of byways.

Reprofiling of small sections of byways can also use hand held equipment, but where reprofiling is undertaken to provide a crossfall, adequate compaction is needed to ensure that the crossfall is retained when the byway is trafficked.

3.8 Repair: drainage

Drainage improvement works are generally less expensive than byway surfacing works, which include works to the underlying structure. As drains perform several roles, it is important to understand what needs to be achieved and the effect drainage may have on protected sites and the surrounding habitats and land. There may be scope for habitat improvement or creation if drainage is sensitively managed. For example, the creation of wet longitudinal ditches positively benefits some species. In addition, works should not be contrary to legislation covering drainage discharge into controlled waters.

When designing, maintaining and constructing drainage, advice should be sought from the local authority ecologist, English Nature or the Countryside Council for Wales as well as the authority's engineering department.

3. Solution choices

Peckforton Gap is an unclassified, unsealed road that runs through open woodland up onto a sandstone escarpment. Historic lack of maintenance by the highway department meant that the byway had become impassable to all but walkers. The byway's main feature is a long straight section of carriageway running directly up the steep escarpment slope. Over time, fast surface water flows down the length of the byway resulted in deep scouring down into the sandstone bedrock. Major reconstruction works were then required. Local sandstone quarry materials comprising large stones were used to infill the scour, which was then blinded with small stones and sand fill. Some evidence of fresh scouring has been noted in subsequent years, but the authority is reluctant to insert cut-off drains across the width of the byway as they may create an obstruction or hazard.

Source: Cheshire County Council

For all drainage, it is important to ensure that the capacity of the drainage system is sufficient to cope with the likely amount of surface water run off. The availability of outfalls into the wider land drainage system affects the type and size of drains. Where outfalls are widely spaced or not available, drainage schemes need to be able to store water away from the byway while it disperses.

Other factors to consider when planning drainage works include:

- Water volume, speed, nature of run off and the likelihood of erosion.
- Design return periods (for example, designing for drainage of typical rainfall, but allowing for the fact that extended storm periods could cause flooding).
- Soil types and erosion characteristics.
- Rainfall intensity.
- Seasonal water courses and springs coming from upland areas.
- Low spots in the byway.
- Exit points for water and buffer points to remove material in suspension.
- Access for cleaning of catchpits, soakaways and settlement traps.
- Associated risk of the drainage system failing.

Walna Scar Pass is a heavily used unclassified road in the Lake District. Frequency data for type and level of use showed that between 120 and 130 4x4 vehicles per quarter, and 150 motorcycles per month use the route. Surveying the route's surface condition indicated little deterioration and the current level of users was considered sustainable. However, a prolonged period of heavy rainfall resulted in a large-scale washout that removed a substantial section of the route. The washout failure is thought to have been because a culvert under the route that conveyed water from the upland catchment area overflowed.

Source: Lake District National Park Authority

Wolven's Lane is a byway popular with the full range of recreational users. It is a long sunken lane with historic boundary banks. The route had a general drainage problem, as well as acting as a water channel during storm periods. The volume of rainfall during storm periods led to significant remedial works being required on sections of the byway and an adjoining section of bridleway. As part of the drainage works, a large brick and rubble filled soakaway was constructed and has proved very successful in draining and storing these peak flows. However, even given the large size of the soakaway, the local geology is not of a sufficiently high permeability to allow natural drainage. Annual maintenance in the form of emptying the soakaway has been found to be both cost effective and practical.

Source: Surrey County Council

3. Solution choices

Ford Lane is an unclassified, unsealed road, which had suffered an historical lack of maintenance. The byway runs between two farmland boundaries. Scour and poor drainage along the route had become so significant that the byway had all the characteristics of a stream. Remedial work was undertaken in 2000 by the authority, with practical expertise brought in by the rights of way team.

Culverting of the stream was undertaken at 'pinch points' where the byway and stream could not run in parallel. The culverts used large diameter UPVC pipes. The use of the largest possible diameter pipes had the benefit of being conservative (safe) in terms of design flows and subsequent maintenance demands, while also meaning the minimum volume of fill needed to be imported to site. Where sufficient width was available, other sections of the byway were re-profiled with a post and plank revetment wall and the stream channelled alongside. Following completion of the works the track was regraded with sand in keeping with the character of the local rights of way network.

Source: Cheshire County Council

Drainage types tend to fall into six main categories:

- Longitudinal open ditches.
- Transverse grips.
- Cut-offs.
- French drains.
- Enclosed drainage systems.
- Culverts.

Fords are included in this section for convenience.

3.8.1 Longitudinal open ditches

The simplest form of drainage is by means of longitudinal ditches at the sides of the byway, combined with a cross fall or camber of the byway surface. Assuming the width is available, these are probably the least expensive forms of drainage to construct and the easiest to maintain.

Ditches between 500 mm and 600 mm deep are suitable in most cases. In the case of simple surface water removal, ditches to a minimum depth of 150 mm below formation level (top of natural soil) are suitable.

Ditches should be constructed so that their side slopes are stable. In general, ditch width should be about 2.5 times its depth. Where ditch slope angles are too steep for the ground they will generally slump and collapse (this process is relatively slow in clay compared to granular materials and may not be immediately obvious), resulting in a reduction of the carriageway width and blockage of the drain. The exception is with hard materials such as rock.

Stabilisation of the sides of ditches with vegetation (bioengineering) can also provide erosion protection through root reinforcement and by reducing the speed of the water, and the vegetation can act as a sediment trap. It is recommended that ditches are lined with a native grass species (or combination of species depending on the local ecology) in order to provide adequate resistance to flow erosion.

The sides of ditches should be profiled to avoid collapse, especially in soft soils. 'U' shaped ditches in peat are notable for their instability. 'V' shapes should be adopted wherever possible. The inclusion of large angular stones at their base with or without fibrous clods of peat both aids support of the ditch sides and protects against scour.

An alternative scour prevention feature for use with drainage ditches is the construction of weirs placed along the ditch. A small pool is developed behind each weir in which flow speeds are small. The flow over the weir is faster. The weir and the place of impact of the water on the downhill side of the weir are made of erosion resistant material. For example, a gabion (coarse crushed stone placed in a rustproof wire basket) could form a weir. Gabions are relatively inexpensive to source and place, and are not too obtrusive in the rural environment. They may silt up rapidly and cease to allow through-flow, acting as a solid block of material. Even with through-flow, the presence of the gabion will slow the water effectively. On the downhill side a stone or concrete slab should be placed to prevent impact erosion from the waterfall over the weir. A more robust solution is a cemented stone or blockwork weir and impact slab.

The disposal or re-use of spoil from newly excavated ditches needs careful consideration. Simply spreading spoil on the surface of a route may lead to rutting and the growth of nettles and thistles where none previously existed. However, if suitable, the spoil can be used on the byway surface, perhaps to introduce cut-offs (see 3.8.3).

Wherever possible, the surface of a route should be a little above the surrounding ground to allow the most effective crossfall into the ditch. If there is insufficient cross-fall, the route may require reprofiling.

Guidance applicable to byways (based upon experience with forestry tracks) indicates that optimum crossfall gradients (in terms of shedding water to the side of the byway) should be around 4.5% and, on steep slopes, road engineering experience suggests gradients between 6 and 8%. Health and safety, in terms of vehicle speeds and byway camber, may require consideration when crossfall values start approaching 8%. Changes in crossfall over distance should also be considered.

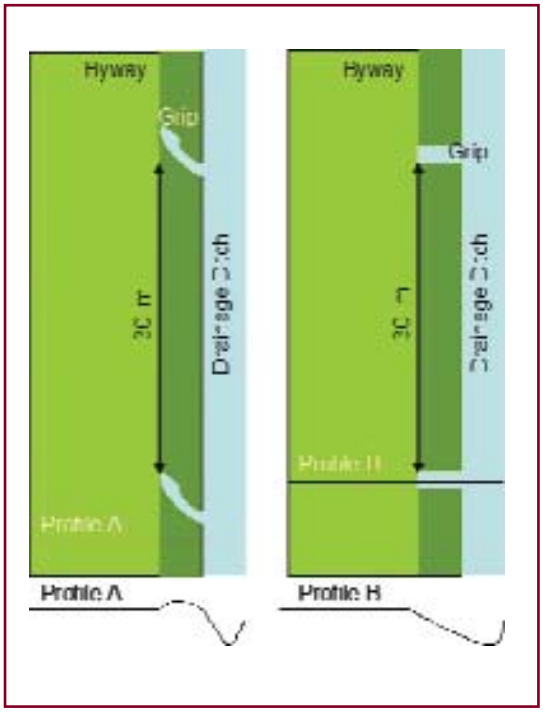
Source: Forestry Commission Civil Engineering Handbook

3.8.2 Transverse grips

Where the byway is lower than the surrounding ground, there will be a tendency for a raised verge to form between the byway and the edge of any longitudinal ditch. Transverse grips will need to be dug through this verge to allow surface water to reach the ditch without softening the byway edges.

Grips are short, narrow, shallow drainage ditches, positioned to take water away from the byway surface. They are relatively cheap to install but require regular clearance to be effective. On flat ground, grips will typically be positioned about 15 to 30 metres apart. Any existing grips need to be cleared and dug out to a width of at least 300 mm. Grips should be avoided if the verge is the only appropriate surface for horse riding on the byway.

Where high water flows are expected, the scour protection measures (described above) may be needed in the grips.



3.8.3 Cut-offs

These are most commonly used on sloping footpaths and are used to divert water flowing down the surface onto the sides. They act as a barrier to water flow down slopes and are raised above the surface of the way. The primary use of these drains is to control scour by shortening the distance water flows along the byway surface. On footpaths, cut-offs are usually embedded bars of wood or stone across the path. This form of cut-off will not usually be suitable for a byway (both in terms of durability and because it is a potential hazard).

Design guidance on various types of cut-off drains and their optimal location along paths is found in the BTCV Manual "Footpaths – a practical handbook" [Agate, E., 1996].

Stone lined ditches (or waths) across the byway perform a similar function to cut-offs but may be suitable when higher density drainage is required. The profile of the byway surface can be adjusted to improve its ability to shed water as an alternative to traditional cut-off bars.

Guidance is available in "Trail solutions – the IMBA's guide to building a sweet single track" [International Mountain Bicycling Association, 2004]. The guidance recommends:

Knicks – semi circular surface profiles, 3 metres in diameter, which funnel water away from the surface on shallow gradients. A 15% crossfall from the centre of the knick is recommended.

Rolling grade dips – knicks followed by a 6 metre ramp in the surface to divert water from steep gradients.

3.8.4 French drains

In granular soils a French drain without a pipe may be used. French drains are similar to longitudinal ditches, but are filled with free draining aggregates. The depth of a French drain needs to be greater than that of a ditch.

French drains collect surface run off and allow it to disperse into the subgrade, making them unsuitable where the subgrade is weakened by the presence of water (for example, clays).

3.8.5 Enclosed drainage systems

If insufficient width is available or the ground conditions are unsuitable for longitudinal ditches, a pipe drainage system may have to be used. A piped French drain (a porous pipe in a stone-filled trench) will collect both surface and sub-surface water.

There is design guidance on pipe beddings, stone-fill aggregates and pipe surround materials. Guidance covers overall grading (including fines content) and other suitability criteria. Generally, pipe bedding materials should not contain aggregate that is likely to damage the pipe work under loading (for example, a well graded sand should be used). Pipe surround and overlying fill should be coarse aggregate, which does not contain significant fines and is unlikely to break down and produce significant fines.

Suitability criteria for materials used in conjunction with drainage (on highway works) is in the Highways Agency's Manual of Contract Documents for Highways Works, Volume 1, Series 500 [Highways Agency, 1998c]. Although this is a relatively high level of specification for typical byway drainage projects, it provides a useful starting point.

Pipe sizes will normally be 150 mm to 300 mm, and the minimum depth should be 750 mm. Further advice about suitable pipes, their installation and maintenance should be obtained from the authority's engineering department.

3.8.6 Culverts

Culverts are enclosed drainage systems which carry water flow under a byway. In some areas, relief culverts may be required to control the build up of water in ditches (depending on the permeability of the surrounding ground). They can be pipe or masonry structures. Culverts are used when the byway is insufficiently wide for longitudinal drainage, or to take drainage flows across a byway. They need regular maintenance to keep them free from blockages. As a general principle, they should be as large as possible.

Practical advice on culverts and headwalls design (based around observational techniques and Talbot's Formula) is in the BTCV Manual "Footpaths – a practical handbook" [Agate, E., 1996].

Where required, catch pits should be provided at culvert pipe inlets to intercept any silts and other material suspended in the water. These need to be at least 300 mm below the pipe invert level, and large enough to contain the expected amount of material. Catch pits need to be cleaned out as part of a drainage maintenance regime.

Where culverts under byways have failed it is sometimes possible to replace them with an "Irish bridge". This consists of smaller pipes laid side by side in a concrete surround. The pipes take dry weather flows and, when the flow exceeds their capacity, the stream flows over the concrete surround, creating a temporary ford. Irish bridges are effective only where the water is in a relatively narrow valley or in a deep channel.

3.8.7 Fords

Fords should have firm, stable non slip approaches, with gentle slopes (less than 1 in 12 is recommended by the British Horse Society) with a reasonably level and firm base. The British Horse Society also recommends that no sharp or other objects hazardous to horses should be placed on the downstream side where the ford is through a watercourse with a strong current. Any stepping stones or footbridge should be on the upstream side.

The surface of Ford Lane comprises sandstone cobbles, which are overgrown and obscured by grass and topsoil. The byway fords a stream. The definitive map shows that a public footpath goes into an adjacent field where there is a stone footbridge over the stream. The byway is used for land management, private access and recreational use. Vehicle and equestrian use has led to deterioration of the surface leading into and out of the ford. Remedial work was carried out at the ford in 1997/1998 in response to requests from equestrians, since the soft boggy ford bed was causing them problems. The stream was dammed and soft ground along the base of the ford was removed. Preformed concrete slabs and kerbstones were set along the base of the ford. The concrete slab is now covered by a thin layer of silt so that the aesthetic nature of the byway has been preserved. The approach to and from the ford has not been treated.

Source: Cheshire County Council

3.9 Repair: resurfacing

Surfacing materials should ideally be chosen from a local source (to allow ready material sourcing and reprofiling or other future maintenance works), and should be aesthetically suited to the local surroundings and nature of the byway. Structural layers typically require only a thin surfacing known as blinding (either because of aesthetics or because of their surface finish). Blinding layers typically take the form of around 3 mm size grains placed in a thin (approximately 10 mm) layer.

User group requirements for a byway surface vary. However, the following key qualities should be targeted:

- Non slip.
- Compacts to provide a firm surface.
- Free draining (does not retain water).
- Requires minimal maintenance (for example, it is resistant to erosion) and/or can be readily maintained (for example, the material is easy to regrade and shape).
- Durable.

Horses require a non-concussive surfacing.

Because of the steep gradients and high verges associated with many routes in Cornwall, surface scour is a concern. When there are significant rainstorms, the routes act as channels down the gradient. Stepping of routes has been attempted but has not resolved the problem. Many surfacings need to be replaced every 5 years. Treated surface materials (surfacing materials with cement or other binders that increase strength, durability and hardness of the candidate materials) are currently being trialled.

Source: Cornwall County Council

Materials such as wood chippings can provide a suitable byway surface for walkers and horse riders. However, they are not considered suitable for other user groups. In Wokingham, the main material used for surfacing is a 4:1 mix of road planings and wood chippings. The wood chippings enhance the process of grass recolonisation. Recycled asphalt planings are obtained when local resurfacing work is carried out. Old Christmas trees provide a free source of wood chips. The materials are stored at a council depot until they are required.

Source: Wokingham District Council

If width and financial constraints permit, consider providing different surfaces along the length of a byway (known as dual surfacing), allowing different users' needs to be more precisely meet. Dual surfacing can occur naturally with time, as most byway surfaces will develop some vegetation growth. Where vehicular use is regular and moderate, growth will tend to be between the wheel tracks, providing a softer surface for horses.

3.10 Repair: reconstruction and reinforcement

Reconstruction is appropriate only if drainage maintenance or improvement have been considered and rejected. Reconstruction can also be done during drainage improvement works.

Failure to adequately compact the structural byway layer can lead to the early onset of deterioration. Compaction is affected by the maximum aggregate size compared to the layer thickness. This is usually not a problem if the layer is at least two and a half times the thickness of the largest diameter of aggregate used (excluding occasional unrepresentative oversize material). The minimum thickness for standard "Type 1 sub-base" and "Type 2 sub-base" materials [Highways Agency, 1998b] should be around 100 mm (typical maximum aggregate size of around 40 mm).

In circumstances where poor subgrades exist it may be feasible to construct a platform of coarse cobble-sized material on which to place a byway structural layer. Compaction of this material effectively punches it into any underlying soft spots and provides a suitable foundation for compaction of the structural layer.

The separation and reinforcement techniques discussed here are:

- Geotextile separators.
- Geogrids.
- Stabilisation.

Incorporating separation and reinforcement techniques into byway reconstruction may improve durability, reduce maintenance frequencies and enable more ready access for maintenance vehicles. In addition, reinforcement means that the overlying aggregate layers do not have to be as thick, offering cost savings (as haulage is often a significant cost of using imported aggregates). For example, a geotextile separator over a poor subgrade will provide a foundation for construction without the need to construct a working platform.

3.10.1 Geotextile separators

Geotextiles are thin sheet-like materials which contain numerous tiny openings (considerably smaller than 1 mm). Geotextiles allow drainage whilst preventing the passage of soil particles. The general function of a geotextile is to act as a separator. Because of their thin and flexible nature they do not provide a significant reinforcement affect.

The structural and surfacing layers over geotextile separators should be sufficiently thick to not expose the geotextile underneath (a minimum depth of 100 mm is recommended). Exposed geotextile byway can shred and be a trip hazard for walkers and horses.

Geotextile separators are commonly placed on top of subgrade materials, before the placement of structural layers and surfacings. Their primary function is to prevent fines migration up from the underlying materials into the byway structural layers (known as mud pumping). They also provide some degree of added resistance when compacting the structural layer onto the subgrade by preventing ready mixing of the two materials. Their main advantage is that they prolong the operational life of the structural layer thereby reducing maintenance costs.

Separators are generally supplied in long rolls. They are relatively easy to handle and perform best on a level surface which is drained and from which all sharp objects have been removed.

Minimum aggregate coverings are recommended by suppliers and care should be taken in planning the construction sequence to avoid damaging the material.

Several proprietary products work on the principle of providing erosion protection or temporary reinforcement for soils to allow the establishment of vegetation. Once the vegetation is established they do not need to be removed as they are biodegradable.

Their main practical applications are for seeded ways or exposed soil slopes. Examples of their use on byways are to cover side slopes of ditches that would otherwise be prone to soil erosion, allowing the establishment of naturally reinforcing vegetation.

3.10.2 Geogrids

Synthetic geogrids are sheet like materials with relatively large openings. They can provide structural reinforcement by reinforcing aggregate layers by means of mechanical interlock. Geogrids range in stiffness, aperture size, rigidity and rib thickness. When placed on weak subgrade it has been proved that the stiffer geogrids allow the reduction of aggregate thickness or prolong life for the same thickness.

Even though it is more expensive than geotextile separators, geogrid reinforcement may be cost effective because it enables the thickness of overlying structural layers and surfacing to be reduced, and lowers maintenance costs.

Care should be taken during installation in order to follow manufacturer's recommendations in order to obtain optimal performance. Given the cost implications, geogrids may not be suitable for entire lengths of byways, but could be used on short sections of byways, for example where the subgrade is particularly weak.

It is possible to purchase geocomposite materials which act as both a separator and reinforcer. Geotextiles and geogrids can also be used as protection during temporary works (for example, as temporary measures to prevent machinery damaging areas off the alignment of the byway that are traversed during construction works).

A 35 km long access road over peat and glacial materials was required to follow power lines. The route crossed open peat bogs with up to 6 metres depth of peat to be traversed. Synthetic geogrid reinforcement, laid directly onto the peat in advance of placing the structural layer of aggregates, was used to effectively 'float'" the access road over the formation. Following its completion, the structural layer was blinded.

Source: Tensar International

3.10.3 Stabilisation

Soil stabilisation is an *in situ* improvement technique undertaken on subgrade soils. Small-scale operations tend to involve surface spreading of an appropriate binder (most commonly cement) on top of the subgrade, before rotavation and compaction. The typical rotavators, readily accessible to rights of way maintenance teams, will generally restrict the depth of mixing to a maximum of 150 mm. The amount of binder (typically between 2 and 8% by dry weight of soil), degree of compaction (over the full layer depth), nature of the subgrade and efficiency of the mixing will determine the success of the technique. The aim is to provide a solid structural layer on which surfacing material can be placed, without the need to import large volumes of aggregate.

Limitations of the technique include the suitability of the subgrade (it should not be used on high plasticity clays and organic soils, and sufficient water is required for the reaction to occur without the material being too wet to compact), and temperature (the colder it is the longer the cementitious reactions take). Operations should be suspended during periods of rain and frost (but damage may occur if the material is left uncovered). Ecological effects (such as the suitability of cementitious binders with high pH) should also be considered.

Care should be taken to plan the works efficiently. A maximum duration of two hours between spreading binder and the final compaction of the material is recommended.

4. Procurement

This guide examines the requirements in implementing repair and maintenance solutions. It includes corporate requirements for the procurement of works, the use of land owners (as contractors) and volunteers, health and safety and the execution of construction works.

4.1 Corporate procedures

Authorities have procurement procedures designed to maximise value. The procurement methods for repair and maintenance work on rights of way projects should be chosen to achieve value for money. The approach to procurement depends on the project budget. Each authority will have bands of project costs between which the different approaches should be applied.

- Low-cost projects can be undertaken by single tender actions.
  - This approach is likely to apply to projects with a maximum budget of several thousand pounds (for example, a maximum threshold set at between £1,000 and £5,000). For such projects, other forms of procurement would not offer value since the costs of the procurement approach would outweigh the added value achieved.
  - These projects are usually for individual pieces of work which a contractor may be uniquely able to perform, for example, because of their proximity to the site and their specialist skills. It is not appropriate to let several single tender contracts to one organisation where their overall value exceeds the maximum budget level.
- Medium-cost projects can be undertaken by invitations to tender.
  - These projects are likely to have a maximum budget of above ten thousand pounds (for example, a maximum budget threshold set at between £15,000 and £25,000). They may include annual maintenance contracts and significant repair projects.
  - The authority can select the contractors they invite to tender for the work but usually require two or three tenders to be returned in order to assess value for money.
  - Value is assessed against criteria stated in the invitation document or published elsewhere by the authority. These criteria can include factors important to the project such as knowledge and experience or track record of similar work.
  - This type of procurement can be more efficient if rights of way officers retain a list of up-to-date contact details for contractors experienced in working on rights of way in their local area. In addition, if a minimum number of tenders is required before the contract can be let, it is useful to contact contractors in advance to determine if they are interested in tendering. This way, the rights of way officer can be reasonably assured that sufficient tenders will be received to ensure the contract can be let.
- High-cost projects are usually undertaken by open tenders.
  - This procurement approach applies to projects with a maximum budget exceeding the threshold allowed for the invitation to tender approach of medium-cost projects. It is not uncommon for this procurement approach to apply to projects with a maximum value exceeding £15,000. This may include maintenance contracts where the procurement process is repeated every two or three years. It will also include large repair projects.
  - Open tenders are usually publicised through the trade press to attract tenders from a variety of contractors. Tenders are evaluated in the same manner as those for medium-cost projects.

The Office of the Deputy Prime Minister's publication "Delivering Efficiency in Local Services" [Office of the Deputy Prime Minister, 2004a] indicates that efficiency gains can be made by authorities collaborating in the procurement of services. This may offer benefits to the procurement of works for rights of way.

4.2 Land owners and volunteers

Land owners are very likely to maintain byways which they rely upon for access. These land owners may have significant knowledge and experience of the maintenance needs of their local byway. Authorities should consider asking land owners to act as contractors to maximise the benefits of this knowledge. The public rights of way good practice guide (www.prowgpg.org.uk) outlines the procedures for contracting farmers to carry out maintenance.

A study carried out by Nottinghamshire County Council over the three years from 1991 to 1994 aimed to identify ways in which groups, such as the farming community, local councils and volunteer groups, could help the authority in maintaining and improving the public rights of way network.

The highest priority was placed on devising and investigating a method of involving the farming community in rights of way maintenance. The approach concentrated on offering farmers and land owners payments, based on unit costs, to undertake maintenance work on their own or on their neighbours' land.

The resulting analysis of the approach concluded that this is a very cost effective method of both repairing rights of way and continuing with longer term maintenance of the network. It also had the added benefit of improving co-operation and liaison between the authority and the land owner community.

Source: Nottinghamshire County Council

The growing interest in conservation and the countryside has led to increasing numbers of people wishing to become actively involved in some rights of way. Volunteers from local user groups, parish or local councils or local conservation organisations can provide valuable assistance with surveying of routes, monitoring the condition of routes and physical maintenance tasks.

Many authorities work successfully with volunteer groups to maintain the rights of way network. However, anecdotal evidence indicates that permission to carry out voluntary work is not always forthcoming from authorities, because of concerns about public liability or a lack of insurance cover or because of the quality of the resultant works.

In Surrey, the most regular volunteers for byway maintenance are special needs groups who transform overgrown tracks by cutting back overgrowth, coppicing, unblocking ditches and digging new drainage channels. This enables the surface to dry out and the extra light provides improved habitats for flora and fauna. The volunteers return every year. As well as special needs groups, walkers, horse riders, mountain bikers, and members of the Trail Riders Fellowship and the All Wheel Drive Club carry out volunteer projects.

Source: Surrey County Council

Conservation groups carry out maintenance work at least twice a month. The groups were trained by the District Council to undertake tasks such as vegetation clearance. Volunteers from user groups, such as the All Wheel Drive Club, also carry out maintenance work, including drainage clearance and installation, and surfacing work, under the guidance of the District Council.

Source: Wokingham District Council

Voluntary input by interest groups is now very limited in Wiltshire. A recreational driving club does a little clearance work. The Council's concern is safety of the volunteers and of the byway users who are affected by the results of the voluntary work. Surfacing work by volunteers is specifically excluded for safety reasons.

Source: Wiltshire County Council

The question of liability for accidents, whilst volunteers are carrying out work or after work has been completed, must be decided. First the authority must agree to work being undertaken. The names and details of volunteers should be added to the authority's insurance so that they are covered if there is an accident. The club or organisation which represents the volunteers may also carry insurance for its members for this type of voluntary work. If the task is complex, the authority should provide somebody to oversee the work, such as a warden. On completion the authority should check the work to ensure that it has been carried out satisfactorily, in the same way as it would if it had employed a contractor.

There are some well-established groups (12 to 20 in number) who provide voluntary maintenance input. These have to comply with a standard set by Hampshire County Council, which includes the need to carry third party insurance cover and have proper training. This is a reduction from years ago where voluntary work was unregulated and over 100 groups existed. The Council employs 3 leaders who train and direct volunteer groups and individuals who would not be able to satisfy the voluntary group standard requirements to work unsupervised.

Source: Hampshire County Council

Surrey County Council has several different volunteer groups who work on all types of rights of way. The Council has published a booklet about volunteer work which covers health and safety and tool safety. The Council's volunteer officer writes a risk assessment for all works.

Source: Surrey County Council

4. Procurement

Nidderdale Area of Outstanding Natural Beauty has a stand alone "Volunteer Handbook" that sets out its volunteer policy and covers the information needed by volunteers, including:

- Training requirements.
- Conservation management.
- Health and safety.
- Insurance.
- Expenses.
- Equal opportunities.
- Confidentiality and data protection.

The handbook includes different work outlines so that volunteers can assess their suitability. Each outline presents a clear managerial chain of command, details typical work objectives and tasks, and summarises the required skill base and the scope and level of training that will be given. A contract is appended, which states that all volunteers working on tasks supervised by members of the Nidderdale Area of Outstanding Natural Beauty team are covered by Harrogate Borough Council's Liability Insurance Policy.

Significant resources have been committed to make voluntary schemes work. Volunteer groups maintain specific parts of the network. A Countryside Ranger is employed to train volunteers, provide tools (non-powered) and direct tasks. Each volunteer signs a volunteer agreement, which means that for insurance purposes they become an unpaid employee of the council and are covered for personal injury and third party liability.

Source: Nidderdale Area of Outstanding Natural Beauty

Before any maintenance work is carried out, the parish or community council, adjacent land owners, residents, local conservation bodies (if they are not involved in carrying out the work) and anyone using the route for access or recreation, should be advised that the work is authorised by the authority and the reasons for carrying it out. When work is underway, it is prudent for volunteers to carry copies of written permission to conduct the work.

Vegetation clearance can be particularly controversial if it involves tree-felling and people are not aware of the long term benefits that will result. Local people can be informed through a site notice or article in a residents' newsletter. Adjacent occupiers can be informed by personal letter. In addition, details should be sent to the clerk of the parish or community council.

A letter is sent to the local County Councillor, Parish Council, District Council and adjoining land owners before any maintenance work is carried out. The letter includes the parish, number and grid reference of the route involved, details of the work to be carried out and the objective of the work, e.g. "... to create a three metre wide path free of surface and overhanging vegetation, with a surface that is level and firm. It must be emphasised that there is no intention to improve the route so that it can be used by ordinary vehicular traffic. Although this lane might / does have public vehicular rights, its main purpose is for recreational use by pedestrians, cyclists and horse riders ..."

Source: Hampshire County Council

4.3 Health and safety

All repair and maintenance activities on byways should comply with the Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999 (Statutory Instrument 1999 No. 3242). Every construction activity should be accompanied by a risk assessment and method statement. Generic risk assessments and method statements can be prepared for routine activities (such as vegetation clearance) but reviewed to include site specific details (such as risks associated with overhead cables).

The Construction (Design and Management) Regulations 1994 (Statutory Instrument 1994 No. 3140) apply to all construction projects which involve demolition or dismantling activities, or last longer than 30 days, or involve more than 4 people on site at any time, including supervision or inspection. The Regulations aim to ensure that health and safety is considered at all stages of the construction project process, from initiation through design to construction and subsequent maintenance. Authorities should check whether repair and maintenance projects on byways are subject to these Regulations.

4.4 Executing works

Clearing vegetation is a maintenance activity on byways often conducted by volunteer groups. Care needs to be exercised to ensure that vegetation clearance does not detract from their landscape, ecological and heritage value. Protected vegetation such as trees with preservation orders must be identified before any work is undertaken. English Nature or the Countryside Council for Wales should be consulted where any works may affect designated sites or protected species.

Resurfacing work using small construction plant (photograph courtesy of Mendip District Council)

The times for clearing vegetation are limited by factors such as weather, type of vegetation cover and bird nesting seasons:

- For woody growth, such as brambles, scrub and hedgerows:
  - Bird nesting season generally runs from early March until August, precluding maintenance work during these periods.
- For lush growth with no woody vegetation:
  - Cut back twice per year in May/June, and again in August/September.
  - If only one cut per year is possible, May/June should be given priority.
- For both types of vegetation clearance:
  - Working during the winter months minimises disturbance to flora and fauna.
  - October and November are often the best months as underfoot conditions are likely to be less wet than in winter or spring.

4. Procurement

Periods when the ground is very wet are often unsuitable for maintenance or repair works because of the potential for long term damage to vegetation and soils. Larger scale works may involve the use of either small scale or heavy plant. Ground compaction and/or erosion as a result of heavy machinery used off the line of the byway can cause long term damage to trees by damaging root systems.

Practical maintenance experience has shown that best practice in undertaking remedial works involves aggregate being double handled. Initially it is placed at a suitable drop off point and then shuttled down to the construction site on a dumper (or equivalent). This has been shown to maximise the use (spread) of the aggregate and also avoids haulage lorries (with their relatively high axle loads) damaging other sections of the byway.

Source: Wiltshire County Council

Through Part IIA of the Environmental Protection Act 1990, the Environment Agency is responsible for protecting controlled waters in England and Wales. Pollution of controlled waters is an offence, irrespective of the activity that caused it. This could include the release of pollutants from construction materials, or spillages or leaks during construction activities or use of byways.

A "General guide to prevention of pollution" [Environment Agency, 2004] is available from the Environment Agency web site. The guide advocates the use of sustainable drainage schemes which play a role in retaining pollutants and managing peak flow drainage. More information on sustainable drainage is available from the Environment Agency and the Construction Industry Research and Information Association (www.ciria.org).

Pollution from effluent discharges is relatively easy to monitor and control but diffuse pollution coming from many sources is of growing importance. Defra is developing guidance on the management of diffuse pollution from agriculture, and is conducting research into diffuse pollution from non-agricultural sources. Further information is available from the Defra web site. Given the current reviews of sources and impacts of diffuse pollution as a prelude to developing actions to tackle its occurrence, authorities and land owners should check the latest advice before undertaking the maintenance and repair of byways or reviewing their continued use in order to minimise the impacts of diffuse pollution.

5. Sources of further information

Department for Environment, Food and Rural Affairs (Defra)
Nobel House, 17 Smith Square, London SW1P 3JR
www.defra.gov.uk

Countryside Agency
John Dower House, Crescent Place, Cheltenham GL50 3RA
www.countryside.gov.uk

Office of the Deputy Prime Minister
26 Whitehall, London SW1A 2WH
www.odpm.gov.uk

Department for Transport
Great Minster House, 76 Marsham Street London SW1P 4DR
www.dft.gov.uk

Department for Environment, Planning & Countryside Welsh Assembly Government
Crown Buildings, Cathays Park, Cardiff CF10 3NQ
www.countryside.wales.gov.uk

Countryside Council for Wales
Maes-y-Ffynnon, Penrhosgarnedd, Bangor, Gwynedd LL57 2DW
www.ccw.gov.uk

Environment Agency
Rio House, Almonsbury, Bristol BS32 4UD
www.environment-agency.gov.uk

English Nature
Northminster House, Peterborough PE1 1UA
www.englishnature.org.uk

English Heritage
PO Box 569, Swindon SN2 2YP
www.english-heritage.gov.uk

Cadw
Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ
www.cadw.wales.gov.uk

Land Access and Recreation Association
LARA – PO Box 20, Market Drayton TF9 1WR
www.laragb.org.uk

Waste and Resources Action Programme
The Old Academy, 21 Horse Fair, Banbury, OX16 0AH
www.wrap.org.uk

5. Sources of further information

The All Wheel Drive Club
PO Box 186, Uckfield TN22 3YQ
www.awdc.co.uk

The Auto Cycle Union
ACU House, Wood Street, Rugby, Warwickshire CV21 2YX
www.acu.org.uk

The Ramblers' Association
2nd Floor Camelford House, 87-90 Albert Embankment, London SE1 7TW
www.ramblers.org.uk

The Trail Riders Fellowship
PO BOX 196, Derby, DE1 9EY
www.trf.org.uk

British Driving Society
27 Dugard Place, Barford, Warwick CV35 8DX
www.britishdrivingsociety.co.uk

British Horse Society
Stoneleigh Deer Park, Stareton Lane, Kenilworth, Warwickshire. CV8 2XZ
www.bhs.org.uk

Green Lanes Environmental Action Movement
PO Box 5206, Reading RG7 6YT

Byways and Bridleways Trust
PO Box 117, Newcastle upon Tyne, NE3 5YT
www.bbtrust.org.uk

Council for National Parks
6/7 Barnard Mews, London SW11 1QU
www.cnp.org.uk

Campaign to Protect Rural England
128 Southwark Street, London SE1 0SW
www.cpre.org.uk

For more information on the Lake District Hierarchy of Trail Routes visit the National Park Authority web site: www.lake-district.gov.uk.

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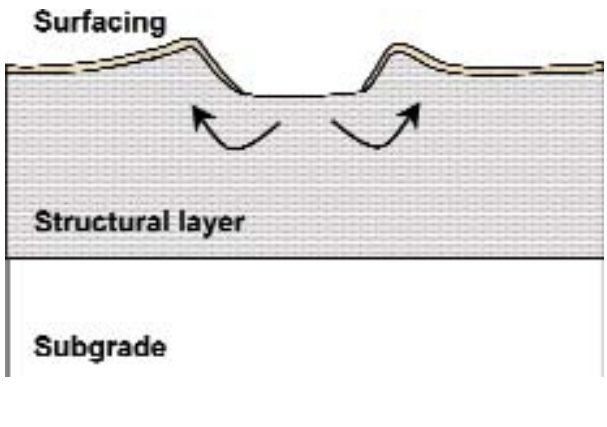
7. Distress information sheets

Many different forms of distress are seen on byways. (Distress is the visible symptom of byway deterioration). The information provided here is for initial guidance. The type and cause of byway distress should be determined and corroborated at each site using condition data, weather records, knowledge of the local materials, topographical information and other data sources.

Distress Information Sheet 1

Type of distress: **Structural layer rutting**

Description: Longitudinal depression formed by wheeled traffic. The surface is raised alongside the rut. The raised edge may not be obvious upon cursory inspection, particularly as wandering traffic may push the raised edge down, but is usually evident along at least part of the byway section.



The structural layer of the byway is rutted (with / without a surfacing), The subgrade is not affected.

Scottish forest road with aggregate rutting. The edge of the rut is raised. (Photograph courtesy of W. Tyrrell)

Primary cause: Inadequate structural layer performance – the stress imposed by the wheel was too great for the byway structural layer (with/without a surfacing). The appropriate maintenance or repair action depends on the secondary cause.

Secondary causes:

- Excess water – evidenced by the pumping of water to the surface, high water content at the surface and/or ruts that are in low lying sections of the byway.
- Structural layer of unsuitable aggregate/material – evidenced by degradation (physical breaking down) of aggregate.
- Inadequate compaction – evidenced by permanent deformation over time.
- Frost loosening – evidenced by rutting occurring after frost. (Frost loosening is unusual except in the most exposed areas of the country.)

Overview of maintenance and repair solutions:

Excess water content:

- Inspect drains and either maintain or add drainage.
- Clear vegetation to increase surface evaporation rates.

Poor quality material:

- Replace the structural layer.
- Treat and improve the structural layer material.
- Overlay the structural layer.

The remedy for poor compaction is discussed in the 'Inadequate compaction' distress information sheet.

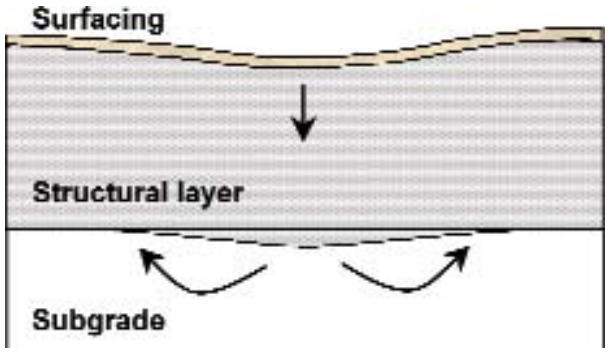
Distress Information Sheet 1 (continued)

Type of distress:	Structural layer rutting
Restrictions options:	• Seasonal restraint Weight restrictions (Weight restrictions are appropriate, for example, where a byway can carry cars but serious aggregate rutting would occur under a truck. Such a restriction could be waived for heavy vehicles with tyres which apply low stresses that are acceptable for a weak aggregate (for example, tractors with large, low pressure tyres).)
Notes:	This form of rutting should not be confused with subgrade bearing failure or rutting caused by inadequate compaction as the maintenance and repair solutions may be different.

Distress Information Sheet 2

Type of distress: **Subgrade bearing failure** under other byway construction layers

Description: A longitudinal depression is formed at the surface, not limited to the centre of the wheel path and without the surface raised adjacent to the rut.



The subgrade layer has deformed, leading to a rut at the byway surface.

An advanced case of bearing failure. The subgrade is poor and the rut has been repeatedly filled or regraded but the underlying problem has not been treated so the rutting recurs. (Photograph courtesy of W. Tyrrell)

Primary cause: The subgrade has insufficient ability to carry the stresses from traffic that it receives despite load spreading by other byway construction layers. The appropriate option depends on the secondary cause.

Secondary causes:

Inadequate subgrade performance can result from:

- Excess water content in the subgrade - evidenced by pumping of water to the surface, high water content at the surface and/or ruts that are in low lying sections of the byway
- Inadequate thickness of overlying material so that the stress from traffic is insufficiently diminished when it reaches the subgrade.
- Inadequate quality of overlying material having the same effect as inadequate thickness.

Overview of maintenance and repair solutions:

There are two principal solutions:

- Improve the drainage of the subgrade and clear vegetation (Many byways which suffer bearing failure are on heavy clay soils that are not easily drained. However, the use of drains should not be discounted as, together with other measures, they may be effective.)
- Reduce the stresses experienced by the subgrade by either replacing the existing structural layer with better quality materials (possibly including a geotextile or geogrid layer), improving the structural layer (for example by cement stabilisation) or by overlaying the structural layer (that is, increasing its thickness).

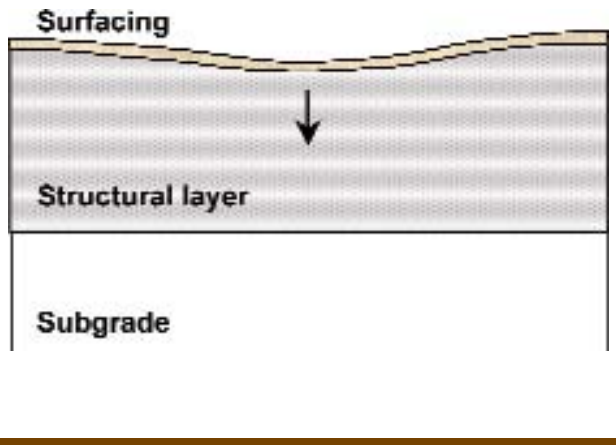
Distress Information Sheet 2 (continued)

Type of distress:	**Subgrade bearing failure** under other byway construction layers
Restrictions options:	Seasonal restraint (Usually appropriate for byways on heavy clay subgrades, restricting all traffic or heavy traffic. These restrictions should also apply to vehicles with large, low pressure tyres (for example, tractors) as it is the overall weight of the vehicle which causes an excessive stress deeper in the subgrade.)
Notes:	• Ponding of water at the interface between the structural layer and subgrade, because of subgrade bearing failure, exacerbates the distress. • This form of rutting should not be confused with structural layer rutting or rutting caused by inadequate compaction as the maintenance and repair solutions may be different.

Distress Information Sheet 3

Type of distress: **Inadequate compaction**

Description: A longitudinal depression forms quickly under trafficking, but this stabilises and does not develop further until water collects in the rut. There is little surface raised adjacent to the rut.



The structural layer (with/without a surfacing layer) has deformed with little surface raised adjacent to the rut and no deformation of the subgrade layer.

A minor case of compaction on a structural layer (without surfacing). A well-defined crossfall means water is unlikely to pond and the byway is unlikely to deteriorate with use.

Primary cause: Inadequate compaction after placement or after a period of freezing and thawing which loosens the aggregate (inadequate compaction or frost loosening).

Overview of maintenance and repair solutions: If the problem is detected early, provide additional compaction. In remote locations the provision of heavy compaction plant may not be feasible and/or cost effective. In these circumstances, preliminary compaction to the best level achievable (for example by hand manoeuvred plant such as a pedestrian roller or vibrating plate compactor) should be made and then further compaction achieved by traffic and weathering. Ruts that occur because of secondary compaction should be filled and the byway should be monitored to check that no other distress forms arise while the byway is reaching its final compacted state.

Notes:

- This distress can result in localised excess water content and the development of other forms of rutting.
- This form of distress should not be confused with other forms of rutting (structural layer rutting and subgrade bearing failure) as the maintenance and repair solutions may be different.

Distress Information Sheet 4

Type of distress: Potholes

Description: A rough hole in the byway surface not much longer than it is wide, mostly in the wheel path and often holding water during and after rain. This distress tends to be localised and does not occur on inclined sections.

Potholes in a byway.

A series of shallow potholes along a wheel path. Ponding water combined with further use could lead to the development of a rut. An infilled pothole is shown in the foreground.

Primary cause: Small and unavoidable irregularities in the surface of the aggregate structural layers and/or surfacing hold a small puddle of water. When a tyre passes through this puddle it displaces the water rapidly which washes out the fine aggregates and erodes the edges of the irregularity increasing its size. Hence the pothole develops progressively. As the fine aggregates are washed away the coarse stones become loosened and are displaced. This distress may be caused if the crossfall or byway gradient are insufficient to shed water from the surface.

Overview of maintenance nd repair solutions:

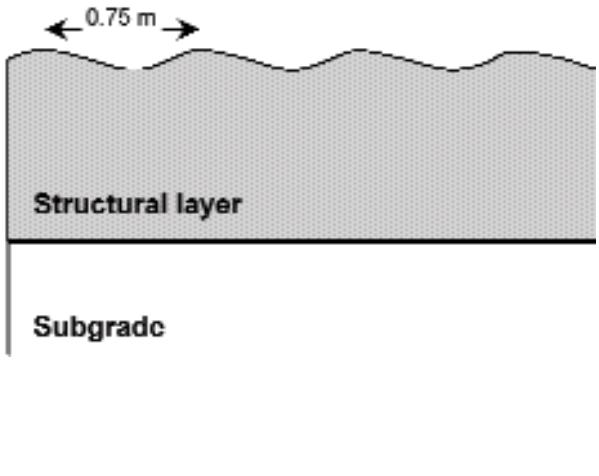
- Reprofile the byway surface to create suitable crossfall or byway gradient to shed water.
- Where a level section is to be reconstructed, make it undulate.
- Fill individual potholes, ideally with bound material to hinder further erosion and make them proud of the existing surface so that water does not collect there again.

Notes This distress does not tend to need immediate maintenance and repair work. However, if left untreated it is likely to cause traffic to leave the line of the byway, potentially causing major damage to the margins or surrounding land. Potholes may be a trip hazard for walkers and horses. Ultimately potholes lead to general byway deterioration seen as rutting.

Distress Information Sheet 5

Type of distress: **Corrugation (also known as washboarding)**

Description: The surface undulates along its length, in the wheel tracks. Undulations typically are spaced at 0.75 metre centres. This distress may be more noticeable on the inside of corners and on byways which experience faster traffic.



The byway surface has regular undulations.

Typical corrugation surface distress on a byway. (Photograph courtesy of A. Dawson)

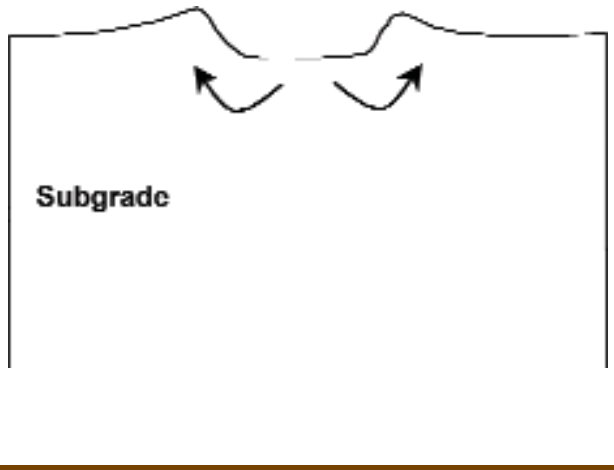
Primary cause: The traffic wheels do not load the byway evenly along its length. Natural variations in the surface level cause suspension systems to vibrate. The corrugations are the result of the hammering action of each vehicle's suspension system vibrating at its natural frequency as the vehicle travels along the byway. On the inside of bends the wheel also tends to snatch then skid as the suspension forces the wheel down then up.

Overview of maintenance and repair solutions: None normally required but if driver and passenger comfort is a problem periodic reprofiling and infilling.

Distress Information Sheet 6

Type of distress: **Bearing failure of subgrade surface**

Description: A longitudinal depression typically showing the print of vehicle tyres very clearly. There is nearly always a noticeable raised surface adjacent the rut.



The subgrade at the byway surface has rutted with a noticeable raised edge.

Bearing failure of a subgrade surface is often associated with localised features. For example, low lying areas which are inadequately drained, as seen in the foreground of the photograph.

Primary cause: The subgrade is too weak to carry the stresses imposed by the traffic it receives and there is no (or no remaining) surfacing to reduce the applied stress. The subgrade weakness can be because of excess water, which, in turn, may result from inadequate drainage. If the surface is soft then attrition may be caused by coarse-tyred vehicles (for example, tractors) plucking out soil in their treads.

Secondary causes: Excess water content

Overview of maintenance and repair solutions:

There are two maintenance and repair solutions, ideally undertaken in combination:

- Provide a more resistant byway surface and structural layer if necessary.
- Improve the drainage of the subgrade and clear vegetation.

Restrictions options:

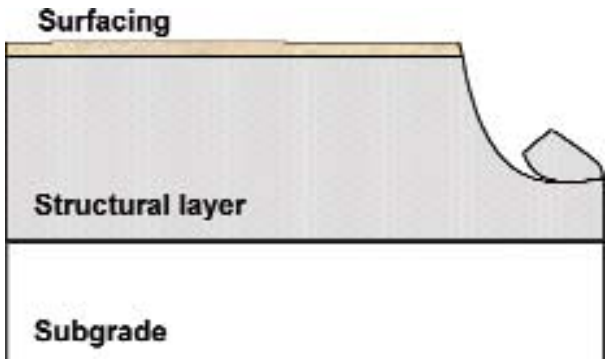
- Seasonal restraint

Weight restrictions (Weight restrictions are appropriate, for example, where a byway can carry cars but serious bearing failure would occur under a truck. Such a restriction might be waived for heavy vehicles with tyres which apply low stresses (for example, tractors with large, low pressure tyres but not those with coarse treads).)

Distress Information Sheet 7

Type of distress: **Edge loss**

Description: Concave arc failures into the byway surfacing are located at the edge of the carriageway. The material inside the curved failure surface is moving downwards and away from the byway. There may be evidence of wheels leaving and regaining the surface.



Failure at the edge of the byway surface.

Edge loss at the side of a byway.

Primary cause: The edge of the byway surface is insufficiently supported to carry the traffic at its edge.

Secondary causes:

- The width of the byway is insufficient for passing traffic.
- Traffic avoids faults (for example, potholes) by driving to one side.
- Previous edge loss may be narrowing the byway surface and as a result the byway suffers the problem more and more frequently.

Overview of maintenance and repair solutions:

- "Haunch widening" (construction of a strip of byway stronger than its parent, perhaps 1 metre wide) where edge loss is prevalent.
- In a section where edge loss is new, infilling repair.
- If passing traffic is a secondary cause, construct passing places at appropriate intervals.

Restrictions options:

- One way traffic where edge loss is caused by passing vehicles.
- Introduction of voluntary restraint requesting users to remain on the track.

Notes: This type of distress occurs only on byways with a well-defined and reasonably serviceable surfacing on soft ground. Often the surfacing is proud of the surrounding ground. Edge loss can have a significant impact on byway users, such as horse riders, walkers or runners, who prefer to use the soft ground provided by the margins of the byway.

Distress Information Sheet 8

Type of distress: **Surface erosion**

Description: The byway structural layer, its surfacing and/or its subgrade is being cut into by a watercourse. Significant erosion of fines could pollute nearby streams and rivers. An accumulation of fines may be visible at the bottom of the gradient.

Surface erosion down the wheel tracks formed on a steep and straight byway.

Surface erosion of sand from a low-lying area of byway, where a drainage grip has been excavated to avoid ponding on the byway surface.

Primary cause: The speed of the water is sufficient to pluck out parts of the byway construction that should have remained in situ.

Secondary causes: Secondary causes of this distress may be that inappropriate materials have been used in the vicinity of the flowing water (the case, perhaps, at the bottom of a ford), or that the speed or volume of the water has increased since the byway was constructed.

Overview of maintenance and repair solutions:

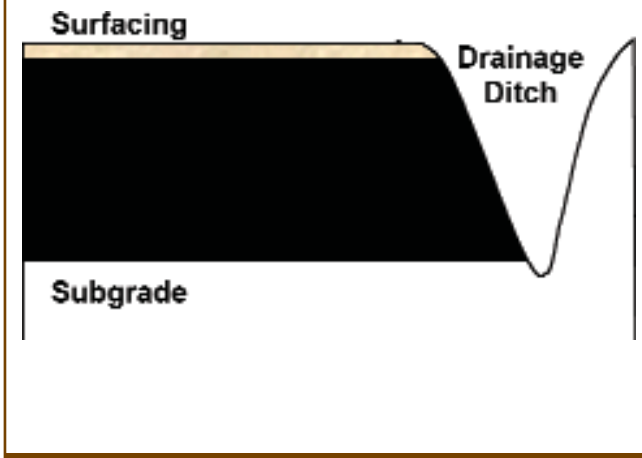
- Where water speeds are unavoidably high, use non-erodible materials (large stones, gabions, concrete and well-anchored timber) in direct contact with the water. Examples may be in fords, gullies or ditch outlets.
- In other situations, limit the water speed by keeping the depth of the flowing water very shallow. On the byway surface, provide diagonal cut-off drainage across the carriageway at intervals up the climbing section of the byway.

Notes: This type of distress applies to byways climbing or descending a gradient, on a side slope, or in a dip, and byways crossed by watercourses at a ford. Inclines provide a preferential path for water flow. Erosion by water flowing down a wheel track might be confused with rutting caused by the passage of vehicle wheels.

Distress Information Sheet 9

Type of distress: **Scour**

Description: The byway has erosive channels, under-cutting (erosion at the toe of a bank) or newly exposed steep faced surfaces of byway subgrade, structural layer or surfacing (especially visible after water levels have dropped following a heavy storm).



Scour of a byway by high speed water flowing too quickly along a drainage ditch.

A history of drainage down the length of this byway resulted in scour at its intersection with a lower lying bridleway.

Primary cause: High speed water, often at greater depths than normal, has eroded soil and/or byway layers, potentially or actually undermining the byway or a culvert or bridge support.

Secondary causes: Secondary causes of this distress may be an inadequate amount of drainage, or poor effectiveness of surface drains designed to direct water to a manageable position. Perhaps an abnormally heavy storm has occurred for which it would have been uneconomic to provide a fully adequate run off system.

Overview of maintenance and repair solutions:

- Adopt scour protection measures such as large stones, gabions, concrete and well-anchored timber.
- In extreme cases, where scour has removed the support, bridges and culverts may need replacement.
- Undertake localised treatment including packing, filling, replacement of revetments and a new drainage system.

Notes: This occurs in drainage ditches, at culverts and other stream or river crossings associated with byways.

Distress Information Sheet 10

Type of distress: **Ponding**

Description: The byway is frequently completely or partly flooded.

Ponding on an upland byway in Wales. (Photograph courtesy of Neath Port Talbot Borough Council)

Ponding on a section of a byway which is in otherwise good condition. There is little verge for users to avoid the ponded water.

Primary cause: There is no easy route for water to flow away. This may be because of blocked outlets, unintentional inlets (for example, lateral drains emptying on to the byway not away from it, or leaks from pipes or adjacent impoundments). The local topography may be too flat to provide effective drainage.

Overview of maintenance and repair solutions:

- Provide a drainage route from the ponding location to a lower level watercourse by clearing blocked drains or drainage improvement.
- Where there is no place to which drainage can be routed (for example, marshes and moorland plateaus) raise the byway level by importing fill.
- Where unintentional water ingress occurs stop or divert water sources.

Restriction options:

Where ponding is seasonal and intervention is undesirable (for example, in a wetland where no drainage can be tolerated and raising of the byway would be intrusive):

- Access can be continued with the proviso that the byway is liable to flooding. (This approach is appropriate if the ponded water does not materially increase the rate of deterioration because of minimal trafficking of the submerged section.)
- Seasonal traffic regulation.

Notes:

This distress occurs on all byway construction types where there is a low point in the byway's elevation. Ponded water is of particular concern to horse riders because sharp objects hidden by the water may injure their horses. Without sufficient margins to avoid ponded water, the route may become unusable by horses in wet weather.

Ponding should not be confused with water ponding in ruts or potholes, that is where there would have been no ponding if the byway had not deteriorated (refer to the information on 'structural layer rutting', 'subgrade bearing failure' and 'potholes).

Distress Information Sheet 11

Type of distress: **Poaching**

Description: Multiple hoof prints in very disturbed/puddled soil that is difficult or uncomfortable to cross by foot, in a wheelchair or mobility scooter.

Poaching in the foreground of the figure is related to a livestock feeding area.

Primary cause: The repeated punching action of hooves in the presence of water leads to slurrification of clayey and silty soils.

Overview of maintenance nd repair solutions:

- Enhance drainage at points where animals congregate.
- Provide hard surfacing across the byway with a crossfall to shed slurry (for example, an aggregate structural layer).
- Seal leaks in drinking troughs.
- Provide a section of surfaced footpath for pedestrians and wheelchair users.

Notes: This distress occurs on byways (commonly with a subgrade surface) subject to significant horse traffic or to which roaming cattle or sheep have access, particularly adjacent to gates and other points that concentrate livestock. Generally it does not occur in dry weather.

Distress Information Sheet 12

Type of distress: **Encroaching vegetation**

Description: Vegetation is overhanging the route, or even growing within the boundaries of the route, impeding free passage and preventing wind and sun from drying the byway surface (which may contribute to byway deterioration).

Overhanging vegetation from trees is cleared and the byway remains passable. Vegetation encroaching on the byway, seen in the distance, is associated with a wet and rutted byway surface.

The routine clearance of vegetation prevents brambles encroaching on the byway. The wet byway surface is not caused by a lack of vegetation clearance.

Primary cause: Natural growth and failure to cut-back the vegetation result in overhanging and encroaching vegetation. (The vegetation may be desirable for conservation purposes or to ensure the health of a protected tree).

Overview of maintenance and repair solutions: Cut back vegetation toallow air and light to reach the byway surface.

8. Action sheets

The following sheets summarise the information in this guide about actions for byway stakeholders to support the effective management of byways used by mechanically propelled vehicles, particularly for recreational driving.

Action sheet 1: Key actions for recreational mechanically propelled vehicles drivers

Action sheet 2: Key actions for other user groups

Action sheet 3: Key actions for land owners and others who use byways for access

Action sheet 4: Key actions for authorities with an extensive byway network attracting large number of recreational mechanically propelled vehicle drivers

Action sheet 5: Key actions for authorities with few byways

Action sheet 6: Key actions when making a traffic regulation order

8. Action sheets

Action sheet 1: Key actions for recreational mechanically propelled vehicle drivers

To ensure the continued viability of recreational driving on byways it is important that you:

- Engage constructively with authorities, land owners, other users and stakeholders. Your commitment, enthusiasm and input can make a difference to the management of byways and their use for recreational driving.
- Be aware that byways are multi-user routes. There may be many more walkers, pedal cyclists and horse riders using the route than mechanically propelled vehicles. Expect to meet other users at any time. Drive and ride with extreme care for others.
- Encourage other users to be tolerant of you by having care for them and acknowledging them.
- Exercise self regulation on where you drive. Expect that some routes will be busy with other users at weekends and over holiday periods. Avoid these routes at busy times and drive with extra care and caution for others.
- Respect codes of conduct and voluntary restraint notices. These agreements have been made by your peers with your best interests in mind.
- Comply with traffic regulation orders. It is an offence not to do so and may result in damage to the byway as well as your reputation.
- Remember that, notwithstanding the public right to use the highway, no one is allowed to damage the surface of a byway.
- Make a report to the local authority and the police if you witness irresponsible or illegal driving. Irresponsible and illegal drivers affect the reputation of the whole recreational driving community. Be as specific as possible, include notes on any vehicle markings and photographs if you can.
- If you experience unreasonable behaviour from other byway users, report it to the local authority. Be a specific as possible and include photographs if you can.
- Make good choices. Learn to recognise the early signs of surface deterioration and report these to the local authority.
- Drive slowly past buildings and livestock. Many land owners play an important role in byway maintenance, and may voluntarily repair many of the byways you enjoy.
- Respond to your authority's consultations on their rights of way improvement plan. For your views to count you must put them forward.
- Familiarise yourself with the approaches and achievements of the Lake District Hierarchy of Trail Routes. You may be able to help transfer these tools to your local byway network.
- Be aware of sites of special scientific interest and other conservation features. Damage to such sites may be a criminal offence.
- Offer to take part in volunteer working parties doing vegetation clearance and minor maintenance tasks. Make sure you have the permission you need to carry out volunteer work and carry a written copy of it when you undertake such work.

Action sheet 2: Key actions for other user groups

Mechanically propelled vehicles users have a right to drive on byways open to all traffic. You will meet vehicles from time to time. To support the enjoyment of byways for everyone:

- Engage constructively in management initiatives put in place by the local authority. Your input can help to ensure that effective solutions, which deal with the reality of recreational driving, are found.
- Byways open to all traffic carry vehicular rights. If you want to avoid mechanically propelled vehicles you may wish to avoid routes which are used by vehicles.
- Make a report to the local authority and the police if you witness irresponsible or illegal driving. The local authority may be collecting data to manage its byway network. Be as specific as possible, include notes on any vehicle markings and photographs if you can.
- If you are concerned with the level of recreational driving on the byway network in your local area, discuss how you can support your authority to deliver a realistic management regime.
- Remember that not all deterioration is caused by mechanically propelled vehicles, or by vehicles used for recreation.
- If you are parking to use nearby rights of way or visiting a property nearby, do not block gates, access drives or byways. This can affect land owners and residents, and could be illegal.
- Respond to your authority's consultations on their rights of way improvement plan. For your views to count you must put them forward.
- Be aware of sites of special scientific interest and other conservation features. Damage to such sites may be a criminal offence.
- Offer to take part in volunteer working parties doing vegetation clearance and minor maintenance tasks. Make sure you have the permission you need to carry out volunteer work and carry a written copy of it when you undertake such work.

8. Action sheets

Action sheet 3: Key actions for land owners and others who use byways for access

Byways are more frequently used for land management vehicles than for any other type of driving. To support the management of this resource:

- Engage constructively in byway management initiatives put in place by your local authority. As a byway user your views and experience are important.
- Respond to consultation on your authority's rights of way improvement plan. It may affect byways you rely on, or ones that are close to your buildings or livestock.
- Make a report to the local authority or the police if you witness irresponsible or illegal driving. The local authority may be collecting data to manage its byway network. Be as specific as possible and include notes on any vehicle markings and photographs if you can.
- Find out from your local authority if you need consent to remove vegetation from trees or hedgerows.
- Be aware of sites of special scientific interest and other conservation features on or near your land. You may need consent from English Nature or the Countryside Council for Wales to conduct minor repairs on byways close to these features. Ensure the materials you use are compatible with these sensitive areas. Seek advice from the local authority ecologist, English Nature or the Countryside Council for Wales.

Action sheet 4: Key actions for authorities with an extensive byway network attracting large number of recreational mechanically propelled vehicle drivers

Recreational driving on byways is an emotive subject often informed by subjective opinions rather than objective data. When assessing the management of recreational driving on byways consider these points:

- Create a mechanism for direct liaison with recreational motor vehicle users. Encourage these users to take ownership of problems and be active partners in creating solutions.
- Consensus-based management may be more successful than traditional approaches. Consensus management practices that promote responsible driving and explicit policies which discourage or oppose recreational driving on byways are not mutually exclusive.
- Transparent policies to manage byways, including applying traffic regulation orders, will gain support across all user groups, particularly where data are available to support the policy.
- Signing and voluntary restraint can be practical measures to manage byways, if supported by all byway users.
- Familiarise yourself with the approaches and achievements of the Lake District National Park Authority's Hierarchy of Trail Routes. You may be able transfer these tools to your local byway network.
- Identify features requiring special protection, such as sites of special scientific interest, other protected sites, or sites with archaeological significance, or other ecological sensitivity. Where necessary seek consent from English Nature or the Countryside Council for Wales, English Heritage or Cadw, and comply with the relevant statutory provisions before starting works. Help users and others to understand their significance.
- Be aware that there is legislation governing mineral extraction and use of waste materials. This may affect your material sourcing.
- Ensure that maintenance and repair work on byways is actively managed and takes account of health and safety legislation. This may include regulations you have not previously needed to consider on small projects.
- Effective liaison with other authorities' departments can bring benefits. Liaison with district councils may help in achieving planning permission for off-road facilities, which could be a mechanism for tackling illegal recreational driving.
- If you are considering traffic regulation orders, consult the police and establish how these will be enforced. Ensure user groups and land owners are consulted before you propose traffic regulation orders.
- Take advantage of volunteer work by reviewing and addressing corporate concerns. Voluntary labour can be cost effective and promotes co-operation.
- Consider using land owners as contractors for byway maintenance. Many land owners already undertake work in a voluntary capacity and may have local knowledge and experience helpful for byway maintenance.

Action sheet 5: Key actions for authorities with few byways

There may be a demand for recreational driving in your area which is evidenced by illegal use of footpaths, bridleways, restricted byways or unauthorised driving on public or private land. Even if there are few byways in your area, consider the following:

- Support nearby authorities in their management strategies. Many of the recreational drivers using their byway networks may travel from your area. Your support can include distributing a code of conduct through tourist information centres, garages and vehicle dealerships and recreational driving user clubs in your local area.
- Identify features requiring special protection, such as sites of special scientific interest, other protected sites, or sites with archaeological significance, or other ecological sensitivity. Where necessary seek consent from English Nature or the Countryside Council for Wales, English Heritage or Cadw, and comply with the relevant statutory provisions before starting byway maintenance work.
- Where you propose to use aggregate to maintain a byway in your area, be aware that there is legislation governing mineral extraction and use of waste materials, that may affect your material sourcing for byway maintenance and repair.
- Ensure that maintenance and repair work on byways is actively managed and takes account of health and safety legislation. Maintenance projects that involve more than four staff or take more than 30 days have to comply with the Construction (Design and Management) Regulations 1994.

Action sheet 6: Key actions when making a traffic regulation order

Traffic regulation orders are an important tool for managing recreational driving and protecting the countryside. When the need for a traffic regulation order is understood by recreational drivers and the evidence for making the order is presented, traffic regulation orders are generally supported. In order to make traffic regulation orders on byways, the following actions are recommended:

- Publish a procedure which states:
  - The type and quality of evidence on which traffic regulation orders will be made.
  - The types of traffic regulation orders that will be considered under different circumstances.
  - How often traffic regulation orders will be reviewed.
  - Which user groups will be consulted before traffic regulation orders are made.
  - How traffic regulation orders will be publicised.
  - How traffic regulation orders will be enforced.
- The type and quality of evidence required before making a traffic regulation order should include one of the following:
  - A condition survey which indicates that the byway is unsafe for traffic.
  - Sufficient substantiated reports in one year which show that the byway has become unsafe for users not using mechanically propelled vehicles.
  - Data from byway surveys over several years that show that the byway cannot sustain traffic (or some types of traffic) during some seasons of the year.
  - Data from byway surveys over several years that show that the byway can no longer sustain traffic (or certain types of traffic).
  - Risk assessments which show that the byway cannot sustain traffic and cannot be repaired for ecological or heritage conservation reasons.
- The types of traffic regulation order which should be considered include:
  - An immediate temporary traffic regulation order to prevent use (by mechanically propelled vehicles and other users if necessary) while the byway is repaired.
  - A traffic regulation order which restricts access to mechanically propelled vehicles driven by a responsible driver with a permit from the local authority. One year permits would be issued by the local authority and could be restricted to drivers who are members of recreational driving organisations with a published code of conduct. Similar restrictions could apply to other users if necessary.
- A traffic regulation order which prevents access to land management vehicles and/or cars and/or motorcycles and/or other users at certain times of the year.
  - A traffic regulation order which prevents access to land management vehicles and/or cars and/or motorcycles and/or other users permanently.

Action sheet 6: Key actions when making a traffic regulation order (continued)

- Traffic regulation orders should be routinely reviewed:
  - At set intervals (agreed by the authority and user groups).

And

  - Following a byway survey to see if the order should remain in force or be amended. This applies particularly to seasonal traffic regulation orders or those involving a permit system.
  - Following substantiated complaints. This applies particularly to traffic regulation orders involving a permit system.
  - Following maintenance or repair to see if a byway can sustain mechanically propelled vehicles or other users.

  - When making traffic regulation orders on byways, the following groups should be consulted, in addition to those required by law:
  - Mechanically propelled vehicle user groups.
  - Other user groups.
  - Conservation groups.
  - Land owners local to the byway.
  - Residents using the byway for access to their property.
  - Rights of way officers in the local authority.
- Publicising proposals to make, and the making of, traffic regulation orders should include:
  - Notices in the local press.
  - Notices on public noticeboards close to the byway.
  - Letters to local or national representatives of mechanically propelled vehicle user groups and other user groups.
  - Letters to land owners and residents using the byway for access to property.
- Enforcing the traffic regulation order should include:
  - Erecting and maintaining mandatory signs.
  - Using of barriers to prevent access where this is feasible.
  - Understanding the evidence required to bring a prosecution.
  - Agreement with the police to enforce the order when there is evidence that it is being breached.

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