The Countryside Agency
Landscape
Access
Recreation

# On the right track: surface requirements for shared use routes

## (excluding mechanically propelled vehicles)

## Good Practice Guide

Helping everyone to respect, protect and enjoy the countryside

Following publication of the draft Natural Environment and Rural Communities Bill in February, English Nature, the Rural Development Service and the Countryside Agency's Landscape, Access and Recreation division are working towards integration as a single body: Natural England. It will work for people, places and nature with responsibility for enhancing biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas; promoting access, recreation and public wellbeing, and contributing to the way natural resources are managed, so they can be enjoyed now and for future generations.

English Nature is the independent Government agency that champions the conservation of wildlife and geology throughout England.

The Rural Development Service is the largest deliverer of the England Rural Development Programme and a range of advisory and regulatory rural services. With the administration of a multi-million pound grant budget for schemes which support land management, rural businesses and rural communities, the Rural Development Service is the single largest organisation working for the benefit of rural areas in England.

The Countryside Agency's Landscape, Access and Recreation division aims to help everyone respect, protect and enjoy the countryside, protecting natural landscapes; and encouraging access to, enjoyment of and sustainable management and use of the countryside.

**Prepared by Scott Wilson Pavement Engineering Ltd**

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## (excluding mechanically propelled vehicles)

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**Local Government Association**

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Photograph courtesy of British Horse Society (www.bhs.org.uk)

An urban bridleway

Photograph courtesy of Sustrans (www.sustrans.org.uk)

A cycle track

Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.co.uk)

A bridleway across open ground

# 1 Introduction

## 1.1 The purpose of the guide

The Guide contains good practice guidance to help in the selection of the most appropriate surfacing for shared use routes in England. It does not apply to routes which carry mechanically propelled vehicles; and is intended to be used by any organisation or individual responsible for shared use route construction, maintenance and use.

The Guide includes a decision-making framework to help identify which surfacings are needed for shared use routes and when, and where, they should or should not be used. However, it cannot provide universal solutions, as each decision-making process will lead to specific requirements influenced by the particular circumstances of the route.

The Guide builds on existing, respected sources of technical design advice for the construction and maintenance of shared use routes. It has been developed through discussions with stakeholders, consultation via focus group workshops held during Spring 2005, and the collection of issue-based and good practice case studies.

## 1.2 The scope of the guide

Unless otherwise stated, the generic term 'route' is used throughout this Guide instead of 'way', 'path' or 'track'. Within this Guide, a 'shared use route' is a route which is available for use by any combination of walkers, horse-riders and cyclists of all abilities. Shared use routes provide safe, local and attractive routes for commuting, leisure and sport. (e.g. anglers on canal or river towpaths). Examples of shared use routes are:

- Public bridleways - open to walkers, horse-riders and pedal cyclists.
- Cycle tracks - open to walkers and pedal cyclists.
- Restricted byways - open to walkers, horse-riders, horse drawn vehicles (carriage drivers) and pedal cyclists.

Routes which carry mechanically propelled vehicles, whether through public, private or permissive rights, are not included within this Guide. This Guide does not include information on the illegal use of mechanically propelled vehicles on shared use routes. Guidance on the management of routes which carry mechanically propelled vehicles can be found in Making the Best of Byways [DEFRA, 2005].

This Guide does reflect the surfacing requirements of users in invalid carriages/mobility scooters, defined in The Use of Invalid Carriages on Highways Regulations 1988 (Statutory Instrument 1988 No. 2268).

Part III of the Disability Discrimination Act 1995 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 shared use routes. Within this guide, the surfacing requirements of disabled people, especially mobility impaired users are considered within the generic user groups:

- Walkers – including those using wheelchairs or with difficulty walking.
- Cyclists – including the use of specially adapted pedal cycles or tandem cycles.
- Horse-riders – including disabled riders and carriage drivers.

Guidance on working towards inclusive access to the outdoors for disabled people is published elsewhere [CA 2005a].

Within this Guide, case histories and illustrative examples are shown in blue boxes and references to published documents are shown between square brackets, for example [Countryside Agency 2004]. Full details of these reference documents are given in section 10 at the end of the Guide.

This Guide can only be considered to be current at the time of writing. The relevant organisations, listed in Appendix B, should be contacted for the latest information.

## 1.3 Sustainable development

To achieve good practice, the management and maintenance of rights of way must comply with the principles of sustainable development. The 'UK Government Strategy for Sustainable Development' [HM Government, 2005] has established five principles, which form the basis for sustainable development policy. These principles show that a healthy and just society that lives within environmental limits will be delivered through a sustainable economy, good governance and sound science.

Figure 1, indicates the relevance of these five principles of sustainable development to shared use routes and their surfacings. Many of the topics identified are discussed further within this Guide.

The UK Government strategy has identified four priority areas for immediate action, as well as recognising that action is needed to implement changes in behaviour. Table 1 provides a 'headline' overview of these priority areas and indicates their relevance to shared use routes and surfacings. More information on the Government's strategy and priority areas can be found at http://www.sustainable-development.gov.uk

## Figure 1: The relevance of shared use routes to sustainable development

**Living within Environmental Limits**

- Protecting the ecology associated with the route.
- Using in situ materials or reusing waste materials.
- Enabling non-motorised travel within urban and rural areas.

**Ensuring a Strong, Healthy and Just Society**

- Providing high quality facilities for activities which promote health and well-being.
- Providing access to the countryside for mobility impaired users.
- Recognising the needs of all route users.

**Achieving a Sustainable Economy**

- Enhancing the rural economy by developing and promoting routes to local amenities.
- Using route surfacings which minimise maintenance costs over the lifetime of the surface.

**Promoting Good Governance**

- Ensuring planning consents are gained where necessary.
- Establishing formal agreements for permissive routes.
- Procuring works in accordance with corporate procedures.

**Using Sound Science Responsibly**

- Sharing the knowledge and experience of surfacing selection with others.
- Using best practice guidance available from government agencies, user groups and others.

**Table 1: The relevance to route surfacings of the sustainable development priority areas**

| Priority areas | Overview | Relevance |
|---|---|---|
| Sustainable consumption and production | Achieve more with less by innovation and recognising the whole life cycle of goods, services and materials. | Surveying routes to enable selection of the most appropriate surfacing solution<br><br>Examining the whole life costs of surfacings, not just the capital costs. |
| Natural resource protection & environmental enhancement | Protect the quality of air, water, soils and biological resources, minimise exploitation of finite resources and promote the use of renewable ones. | Ensuring that surfacings do not damage the local ecology, archaeology or character of the route.<br><br>Using in situ materials when appropriate, and using recycled resources in preference to new. |
| Sustainable communities | Provide places where people want to live and work, now and in the future. | Providing access to local services and facilities for everyone.<br><br>Consulting users on the needs and requirements. |
| Climate change and energy | Secure change in the generation and use of energy and other activities that release greenhouse gases. | Providing shared use routes which people use in preference to car journeys. |
| Changing behaviour | Help people make better choices. | Sharing, developing and advocating best practice. Encouraging behavioural changes that help deliver a healthier society. |

Photograph courtesy of Scott Wilson Pavement Engineers (www.swpe.co.uk)

Shared use route in the Malverns

## 1.4 Factors in decision-making

When selecting the surfacing for a shared use route, the following factors need to be considered and accounted for:

- **Users' requirements** – Evaluate the surfacing requirements for all the route's user groups and ensure provision for mobility and visually impaired users.
- **Legal status and land management** – Do not infringe the legal status of the route or jeopardise any existing public, private or permissive rights.
- **Route environment** – Maintain the character of the route in relation to its environment. Respect the local environment and surroundings and ensure both ecological and archaeological considerations are addressed.
- **Planning and consultation** – Include surfacing construction and maintenance considerations in the route planning process. Gather views on new routes or significant changes to existing routes.
- **Budget and costs** – To achieve affordable, sustainable, quality solutions consider the 'whole life' costs of surfacings not just the capital costs.

The following sections of the Guide review these factors and expand on particular aspects.

All of these factors need to be considered, but the priority of the factors may vary depending on the route situation. For example, the publication 'Repairing Upland Path Erosion – A Best Practice Guide' states that work on upland routes is not undertaken to "make access easier for people, although this may sometimes be a result", but to protect local nature conservation and archaeological interests and rehabilitate damaged sites [Davies et al, 1996].

# 2 Users' requirements for surfaces

## 2.1 Summary

This section provides an overview of the surfacing requirements for different user groups and different types of trips along shared use routes. The requirements of mobility impaired users are considered within those of generic user groups. The user group walkers includes users in wheelchairs or with difficulty walking, cyclists includes users on specially adapted pedal cycles, and horse-riders includes mobility impaired riders or carriage drivers.

A generic surfacing to meet all users' needs should be:

- Smooth
- Well drained
- Firm but with some 'give'
- In keeping with the character of the route
- Non-slip
- Useable in all weathers

## 2.2 Trip types on shared use routes

Results of user surveys, conducted by Sustrans in 2004 for 70 shared use routes, indicates that the purpose of the trip varies dependent on the location of the route, as shown below.

| Trip Type | Urban route* | Rural route | Comment |
|---|---|---|---|
| Utility | 38.2% | 13.7% | Essential trips to a particular destination |
| ... of which commuting | 16.2% | 9.3% | |
| Recreation | 51.8% | 81.2% | Trips for 'fun' without a particular destination |
| Leisure | 8.7% | 3.9% | Non-essential trips to a particular destination |
| Tourism | 1.3% | 1.1% | |

* Urban routes pass through built up areas with a population of more than 3,000.

These results confirm that recreation is the predominant use on rural and urban routes, but utility use is more common in built up areas. In most instances, horse-riding and carriage driving trips are recreational, where the purpose of a trip is the journey itself. Horse-riding trips mainly occur in rural areas or the urban fringe [Countryside Agency, 2000].

## 2.3 Surfacing needs of different user groups

Details of users' requirements for route surfacings are included in the web-based 'Greenways Handbook' [Countryside Agency, 2000]. These are summarised below.

| User group | Surfacing preferences |
|---|---|
| Utility and leisure walkers | Hard, all weather surfacings. |
| Recreational walkers | Surfacings in keeping with the character of the route. |
| Utility and leisure cyclists | Smooth well maintained surfaces. |
| Recreational cyclists | Hard surfacings are preferred, except by mountain bikers. |
| Horse-riders and carriage drivers | Soft surfacings free of small loose stones and chippings, including glass. |

The consultation at regional focus group workshops held during the development of this Guide identified common requirements across user groups for shared use routes, summarised below:

- Surfaces should be smooth, non-slip, dust-free, provide good ride quality and be useable in all weather. There should preferably be some 'give' in the surface.
- Surfaces should be well drained, and kept free of leaf litter and animal fouling.
- Routes should have adequate width to allow users to pass safely and rest. Vegetation on the route verges and surroundings should be maintained.
- Good forward and peripheral visibility on the route makes users feel safer.
- Routes should be clearly waymarked and signed, with safe user friendly crossings and furniture.

## 2.4 Meeting user needs

To meet the needs of users, it is important to establish both the type of users, on the route and the types of trips they are making.

The information on trip types and users' surfacing requirements indicates that harder surfaces may be acceptable in urban areas where shared use routes are more commonly used for utility purposes. However, surfacings on urban routes should not impact on the recreational enjoyment of the route. For example, a poorly drained earth track through a local park used by recreational dog-walkers and commuting cyclists/walkers would benefit from improved drainage and the addition of a bound surface. The route surface would be 'commuter-friendly' in all weathers but would remain in keeping with the park environment which is desired by the recreational dog walkers.

In rural areas, where horse-riding and carriage driving are likely to be more prevalent, the need for soft surfacings which allow faster speeds should be recognised. Bridleways may be popular with horse-riders because they offer this facility, and changes to surfacing to accommodate other user groups should not jeopardise this use if at all possible.

For many routes, a single surface type will be applied, which is often a compromise between the differing needs of the different user groups and trip types. The surfacing selection should meet the common requirements across user groups as closely as possible.

Dual surfacings can be considered where route width is sufficient, although two separate surfacings can be more costly to construct and maintain. It should be remembered that well maintained wide verges on routes can provide the 'soft' surfacing desired by certain user groups (such as horse-riders, recreational walkers or runners). This approach incurs only the cost of construction of a single surface but does require an adequate on-going maintenance strategy which includes the verges. Where the verges form part of the route surfacing, drainage grips should be avoided as they are a significant hazard to users (see Section 9 for more information on Drainage).

# 3 Legal status and land management

## 3.1 Summary

When determining the surfacings for a shared use route, the following legal status and land management issues to be considered:

- The statutory duty to maintain a route should be regarded as the minimum acceptable standard and the route, and network of routes, may benefit from a higher standard of maintenance.
- A route may have permissive rights, not shown on the definitive map, which the choice of surfacing should account for and not jeopardise.
- If there is limited time left on agreements to provide permissive routes, the selection of a less durable surfacing for short-term use may be appropriate.
- It is generally inappropriate to surface cross field routes which will be ploughed or cultivated.

This section is not intended to be a comprehensive review of legal issues relating to shared use routes. Readers are directed to four reference documents which contain more comprehensive information:

- A guide to definitive maps and changes to public rights of way [Countryside Agency, 2003a].
- Managing public access – a guide for land managers [Countryside Agency, 2005b].
- Rights of Way – a guide to law and practice [Riddall and Trevelyan, 2001].
- Adjacent and Shared Use Facilities for Pedestrians and Cyclists (Draft for consultation) [DfT, 2004b].

Copies of UK Acts of Parliament and Statutory Instruments from 1998 onwards are available online at http://www.opsi.gov.uk/legislation/

## 3.2 Public rights of way

Highway authorities have a statutory duty to maintain the surface of public rights of way that are maintainable at the public expense, and to control vegetation growing from the surface of such routes [Countryside Agency, 2005b]. However, this statutory duty may be insufficient to maximise the potential use of the route or to gain the benefits a higher standard of surface could provide to the route network. For example, a shared use route across clay may be little used in the winter because it is boggy. Introducing drainage may make this route passable by users in the winter, providing an all-year-round link between other routes, effectively extending the available network.

A public right of way is a route over which all members of the public have a right of passage. The status of the route will determine by whom it may be used. Most public rights of way are recorded on 'definitive maps' of public rights of way held by each surveying authority (county or unitary authority) in England, although the inner London boroughs are exempt from the duty to produce such maps. Cycle tracks are not a class of route that must be shown on definitive maps and conversion of a footpath to a cycle track may result in its removal from the definitive map.

It is possible for a public right of way to exist but to not be shown on a definitive map. The Countryside Agency's 'Discovering Lost Ways' project is researching public rights of way not currently shown on definitive maps with a view to submitting applications to highway authorities for additions to the definitive map later in the process. More information on this project can be found at http://www.countryside.gov.uk/LAR/Recreation/DLW

It is also possible for the status of a route to be recorded incorrectly on a definitive map. For example, a route may be recorded as a footpath, but can be upgraded to a bridleway if there is sufficient evidence of use by horse-riders.

Private rights of way (easements) can run along the same route as, or cross, a public right of way. For example, private vehicular access to a farm may coincide with a bridleway. The highway authority is responsible for the maintenance of the bridleway, not the vehicular access.

## 3.3 Permissive routes

Permissive routes exist where a landowner gives permission for public passage. Permissive routes may be supported by a formal agreement as to the length of time for which the permission is granted, and which user groups may use the route. The majority of British Waterways' canal towpaths are not rights of way, but full and open access is provided to the public subject to the right to close them for operational reasons as necessary.

The permissive agreement can be made with the highway authority or user groups and does not infer that the landowner has any intention of dedicating the route to become a public right of way. The periods of permission vary but 10-year agreements through the environmental stewardship scheme, or licences of up to 25 years, are not uncommon. Permissive agreements will also make clear who is responsible for the maintenance of the route.

Permissive routes can run over the same line as public rights of way and provide access over the right of way for user groups who would otherwise be excluded. For example, a permissive bridleway can run in parallel to a footpath and provide access for horse-riders and cyclists as well as walkers. In such circumstances, surfacing selection should account for users of both the public and permissive rights of way.

The time-span remaining on a permissive agreement, and the likelihood of it being renewed, may influence the selection of surfacing for a permissive route.

## 3.4 Damage to shared use routes

When selecting surfacings for cross field routes consideration should be given to whether or not the field is ever likely to be cultivated. It will generally be inappropriate to apply a surfacing to a path crossing a cultivated field.

The Rights of Way Act 1990 amended the Highways Act 1980 so that it is an offence to disturb the surface of a highway (including footpaths, bridleways, restricted byways or byways open to all traffic) such that it becomes inconvenient for the exercise of the public right of way.

Cross field footpaths and bridleways (as opposed to those which run along field boundaries) may be ploughed or otherwise disturbed unless it is reasonably convenient to avoid doing so. If a route is ploughed or cultivated, the landowner or occupier has a duty to 'make good' the route within 14 days of first cultivation of the crop (for example ploughing) and 24 hours of subsequent cultivation (for example, harvesting). Longer periods may be agreed in advance with the highway authority.
The landowner or occupier must reinstate the path to a minimum width of:

- 1 m for footpaths.
- 2 m for bridleways.

Field edge paths should never be ploughed out and/or cultivated, with minimum widths of:

- 1.5 m for footpaths.
- 3 m for bridleways.
- 5 m for restricted byways.

If a cross field path is ploughed out and not restored, a highway authority may serve notice on the occupier and, if necessary, restore the path itself and send the bill to the occupier. It can also, after serving a similar notice, clear crops that are rendering a path inconvenient to use, and again send the bill to the occupier.

Photograph courtesy of Oxfordshire County Council (www.oxfordshire.gov.uk)

**Example of the reinstatement of a bridleway crossing a cultivated field**

# 4 Assessment of the route environment

## 4.1 Summary

The following aspects should be assessed for a shared use route when determining surface requirements:

- Ensure the surfacing solution is appropriate to the local conditions by conducting a route survey.
- Minimise gradients to enable access by less experienced or less fit users.
- Understand the local natural ground material and, if possible, use this as the route surface.
- Make sure that there are no important groundwater resources which might be affected by the route or its construction.
- Undertake landscaping and reinstatement activities sensitively, to maintain the character of the area and to encourage use.
- Conduct an ecological survey prior to any new build or maintenance works programme.
- Check with the local authority archaeological unit that works will not affect sites of archaeological or historic interest.

## 4.2 Surveys

To ensure that the surfacing solution selected is appropriate for the route, it is essential to carry out an initial survey. Only by understanding the route, such as its drainage characteristics, can good surfacing decisions be made. Typical information and data obtained as part of the route survey should include [Scottish National Heritage, 2001]:

- Details of the route and its users' needs.
- Ground and surface conditions.
- Climate/weather considerations
- Details of topography, including gradients.
- Positions of hazards, such as unstable scree slopes or mineshafts.
- Landownership boundaries.
- Areas of special scientific, scenic or historic interest.
- Location of watercourses and any other drainage issues.
- Location of buried and overhead services and public utilities.

For existing routes, much of this information may already be available as photographs, sketches, and previous survey measurements in databases or case note files. In these circumstances, reviewing the existing information allows a survey strategy to be developed which focuses on the information that needs to be updated. For example, the natural ground material of a route is unlikely to change, but the number and type of users may have changed since the last traffic survey.

For new routes, more comprehensive route surveying is required, although initial desktop research of readily available information will inform the survey. It may be appropriate to undertake surveys twice to assess seasonal variations, such as differences in traffic and surface condition in summer and winter months.

## 4.3 Landscape and topography

The landscape and topography dictates the accessibility of existing shared use routes and can restrict the gradient and alignment of new routes. Shared use routes in upland areas tend to be influenced by steeper gradients and constrained by topographical conditions, whereas lowland areas are often able to accommodate shallower gradients. Thus, in some instances it can be difficult to provide routes without challenging gradients, which may restrict access to only the more experienced or fitter individuals within user groups. Although, the ideal maximum gradient for horses is 1:12 (8%), the capability of both the horse and the rider will determine the gradients which can be negotiated.

The performance of surfaces themselves will be influenced by gradient, with upland routes particularly prone to erosion and scour. In general, gradients of less than 1:20 (5%) allow effective surface water run off without causing scouring and erosion of unbound surfaces. The Scottish National Heritage publication, 'Lowland Path Construction', notes that unbound surfaces on gradients less than 1:20 (5%) should last up to 10 years, whereas gradients between 1:10 (10%) and 1:20 (5%) are likely to last only 5 years [Scottish National Heritage, 2001].

The development of a 'meandering' route, which minimises gradients but is sympathetic to the local topography, is possible when sufficient land is available for the route. Under these circumstances it is important that users have good forward and peripheral vision (also called 'lines of sight').

Good forward and peripheral vision helps users to feel safe and secure and will also help to minimise user conflicts. Blind corners should be avoided and vegetation should be maintained so that the 'lines of sight' remain clear.

Landscaping should be sympathetic to the route but also encourage use. For example, heavily shaded routes with low light levels may discourage users. Sensitively removing the overhanging tree canopy will increase the light to the route and in turn users will feel safer when using the route. Landscaping can also be used to minimise the visual impact of a route, perhaps by providing corridors of hedging to shield the route crossing a scenic view.

## 4.4 Natural ground materials

Where possible, the use of the natural ground as a route surface is preferred because it will:

- Be environmentally compatible with the local ecology.
- Complement the character of the local area.
- Minimise the use of finite natural resources.
- Reduce the costs of materials purchase, haulage and handling.

However, the natural ground materials of a route will affect its durability, drainage and its suitability as route surfacing. In general, the natural ground materials can be sub-divided into four classes, dependant on their ability to resist deformation from user traffic:

- **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 and silts.
- **Very poor:** Thick peat deposits.

Good and medium natural ground materials are generally suitable for use as route surfacings. However, factors such as local drainage and local topography are important in its performance as a route surface, and can result in two similar natural ground materials performing very differently.

Most upland areas are associated with solid geology; for example, the chalk of the North and South Downs or the igneous and metamorphic rocks of the Lake District. In general, upland areas are on good natural ground materials that drain rapidly. However, there are exceptions, with poorly drained peat deposits in upland areas well known in the Pennines and the Yorkshire Dales, for example.

Solid rock geology, such as in the Lake District, is capable of carrying all traffic under all weather conditions, but may be slippery when wet. On upland routes, thin soils over solid rock will be readily washed out if the vegetation has worn away. The publication 'Repairing Upland Path Erosion – A Best Practice Guide' recommends the condition of vegetation is monitored to enable preventative action to be taken before damaging erosion occurs [Davies et al, 1996].

Some rock geology is susceptible to deterioration when wet (for example, chalk or mudstones). For heavily trafficked routes on vulnerable rock geologies, drainage will need to be adequately considered and, if necessary, sensitive surfacing to protect the natural ground materials will need to be used.

In general, routes in lowland areas will be composed of medium, poor or very poor natural ground materials that are vulnerable to deformation under traffic and may be unsuitable as a route surfacing. Low lying areas are commonly associated with geologically younger drift deposits, such as boulder clay, gravels and sands, and peat. However, there are exceptions such as low-lying Quaternary sands and gravels in Cheshire, which are good natural ground materials that drain well and are suitable as a route surfacing.

Any natural ground material is more likely to deform when it has high water content, perhaps because of wet weather and/or poor drainage. The performance of the natural ground can be improved by the addition and maintenance of adequate drainage. Of all natural ground materials likely to be encountered, clay is probably the most susceptible to moisture, changing from being hard and brittle in a dry summer to soft and plastic during a wet winter. Some types of clay are more susceptible to seasonal water content change than others and local experience of their characteristics is necessary to understand how they behave as a surface material.

Peat is an organic rich soil natural ground material that can have very high moisture content. It is often found in environmentally sensitive areas indicating that advice from the local authority's ecologist or a professional independent ecologist, and/or from English Nature, should be sought before any works are undertaken.

An indication of local geology can be obtained from published geological maps (solid and drift deposit editions), available from the British Geological Survey (www.bgs.ac.uk). This information should be used in conjunction with local surveys but is no substitute for undertaking local intrusive investigations to confirm the nature of the natural ground materials.

In some instances, the natural ground materials may have been altered or removed. In these circumstances, route construction on made-up ground or man-made embankments may be appropriate.

## 4.5 Controlled waters

The potential for pollution of water supplies from construction and use of the route should be considered. The Environment Agency has designated Groundwater Source Protection Zones which protect water resources used for the public drinking water supply. There are three zones commonly used:

**Zone 1** Inner protection

Area with the greatest risk of polluting a drinking water abstraction point as a result of activities in the area.

**Zone 2** Outer protection

Area where pollution from activities in the area should have been diluted by the time it reaches the drinking water abstraction point.

**Zone 3** Total catchment

The area needed to supply water to the drinking water abstraction point.

The Environment Agency website includes a tool to show any drinking water sources near a postcode or town name (http://www.environment-agency.gov.uk/maps/info/groundwater). The local Environment Agency office should be contacted to confirm whether a route is located in a groundwater protection zone and whether any restrictions or regulations apply.

## 4.6 Nature conservation

As part of the route assessment, an ecological survey should be carried out prior to any new build or maintenance works programme. Before any work is carried out on the ground it is essential to identify if the planned works will affect land with:

1) A statutory nature conservation designation, for instance a Site of Special Scientific Interest (SSSI).
2) Protected species including all bats and certain birds, fish, mammals, reptiles, amphibians, invertebrates and plants.

An application to improve or maintain a public right of way or other route affecting a designated site will normally require consultation with English Nature, who may issue consent for the operation under the Wildlife and Countryside Act 1981 (as amended). If the site is notified under European legislation as either a Special Area for Conservation (SAC) or a Special Protection Area (SPA), then the Conservation (Natural Habitats, &c.) Regulations 1994 (Statutory Instrument 1994 No. 2716) are relevant and any plan or project affecting a European site must be considered in accordance with procedures under Regulation 48.

Any work affecting a site with a protected species will need an ecological survey to determine the status and distribution of the protected species. Once the survey has been carried out work may then progress with certain conditions, or may require a licence from the appropriate authority. Surveys are generally linked to the summer season. Therefore, the timescales for works will be affected by the timescales to complete these surveys.

English Nature, local authority ecologists or professional independent ecologists should be consulted and will be able to advise in this respect.

There are some good practice working principles which will help to mitigate the effects of surfacing works on the environment:

- Time works to avoid any period when wildlife may be vulnerable to disturbance or damage.
- Avoid working in very wet conditions because of potential long-term damage to vegetation or soils.
- Avoid ground compaction by heavy machinery and/or storage of materials (which can cause long-term damage to tree roots and damage to soil structures).
- Use local materials to match local conditions.
- Consider the effects of drainage on adjacent habitats.
- Consider whether the route and its surfacing fit into the wider landscape.
- Consider whether the design of a path can provide positive opportunities for people to have beneficial contact with nature, or to steer people away from very sensitive nature conservation areas.

### Example of ecological consideration in route surfacing

English Nature specified the use of granite dust in the Wyre Forest as it has a neutral pH and had been used elsewhere in the forest. Initially, problems were encountered, as granite dust does not bind like limestone dust and with the regular horse use the surface condition deteriorated. However, a mixture of granite dust that contained some clay overburden was used on some access roads. This mixture, along with the compaction caused by the heavier use of the access roads, resulted in a better surface that could withstand horse use.

*Source: Sustrans*

Route surfacing work may affect nature conservation interests in a number of ways, dependent, in many instances, upon the local wildlife found on, adjacent to or near the route. For example, surfacing routes may affect burrowing wasps which require bare sand habitats, and reptiles that use bare ground for basking and breeding. Route maintenance such as the clearance of vegetation or cutting of trees and scrub may also significantly impact upon birds and dormice and the provision of infrastructure such as additional lighting may be a particular issue for bats.

Shared use routes may act as potential routes for creatures such as small mammals, foxes, reptiles and badgers to safely cross waterways and roads.

## 4.7 Archaeology

Construction or maintenance of shared use routes must not cause damage or adverse disturbance to ancient monuments or sites of archaeological interest. Sites which are designated ancient monuments are maintained on the 'Schedule of Ancient Monuments', kept by the local authority archaeological unit, and protected by the Ancient Monuments and Archaeological Areas Act 1979. There are over 200 classes of ancient monument, ranging from prehistoric standing stones and burial mounds through to collieries. A 'scheduled monument consent' is required before work can be undertaken, which is administered by the Department for Culture, Media and Sport and English Heritage.

Historic routes of archaeological value, such as bridleways surfaced with pitched stone during the industrial revolution, should also be protected, even if they are not scheduled ancient monuments. If in doubt about the archaeological status of a route or its immediate vicinity, contact English Heritage or the local authority archaeological unit, who will be able to advise in this respect. Local heritage issues should also be considered, particularly in material selection. Materials should match the historic environment in both rural and urban areas, and complement local distinctiveness.

## Example of canal towpath regeneration using materials to suit the local character

A 7 km length of canal towpath in Nottingham is now being used by increasing numbers of cyclists and pedestrians following major reconstruction works. The towpath was underused because of its poor surface condition and encroaching vegetation. The improvement to the route has provided a link from the east and the west of the city to the centre, where there are a number of major employers as well as the bus and rail stations, and the tram terminus.

The unbound surface of the towpath had been worn away, resulting in potholes and water ponding. The 2 metre width of the route had been reduced to 0.5 metres in some places, because of encroaching vegetation from the towpath edgings and across the canal coping stones. Many of the 20 access points along the route were stepped, restricting access by bicycles, wheelchair users and parents with pushchairs.

Because of the anticipated high usage, the central half of the route was surfaced using block paving, selected as it replicates the look of traditional stone setts. The sub-urban areas, the route was laid with an asphalt base and a crushed stone chip surfacing. The towpath was widened to 3 metres, and access for wheel chairs, cyclists and pushchairs was provided, where feasible.

The £1 million improvement works were financed by a partnership between the Greater Nottingham Partnership, Nottingham City Council, British Waterways, the Inland Waterways Association and Wren Recycling, with the phased programme of works completed between 2002 and 2005.

*Source: Nottingham City Council*

### Before and after photographs of the city centre and sub-urban surfacings

**Photographs courtesy of Nottingham City Council (www.nottinghamcity.gov.uk)**

# 5 Planning, consultation and avoiding conflict

## 5.1 Summary

The surfacing of shared use routes should be considered within the network design process. This section does not provide detail on network design. However, information regarding network design is contained in the 'Greenways Handbook' [Countryside Agency, 2000], Sustrans' 'Information Sheet on Shared Use Routes' [Sustrans, 2000] and the Department for Transport's 'Policy, Planning and Design for Walking and Cycling' (Draft for consultation) [DfT, 2004a] and 'Adjacent and Shared Use Facilities for Pedestrians and Cyclists' (Draft for consultation) [DfT, 2004b].

In addition to considering the type of surfacing at an early stage of the network design process, early consultation should be conducted to gather users' views, particularly when new routes or significant changes to an existing surface are proposed. Adequate maintenance is known to be important to avoid conflicts between users of shared use routes. Surfacing choices should also be made to avoid creating conflicts, although these are known to be infrequent on shared use routes.

## 5.2 Planning

A creation agreement or order made under the provisions of the Highways Act 1980 will be required to create a new route, or to upgrade an existing route; for example, to upgrade a footpath to a bridleway. An order under the Cycle Tracks Act 1984 will be needed to convert a footpath into a cycle track. Providing a sealed surface to a previously unsealed route may require planning permission. In some instances, other warrants or consents may also be required; for example, consent from English Nature or British Waterways. To confirm that planning permission is not required contact the local authority planning department.

Surfacing for shared use routes should be considered as part of planning and consultation within the route design process. The following actions should be taken when surfacing construction or maintenance is being planned:

- Produce specifications and drawings for the routes, including details of access points, highway crossings and so on.
- Specify durable materials that are appropriate to the local surroundings and the anticipated levels and types of use.
- Check that the route, and its surfacing, does not spoil an attractive view or habitat, and minimise ecological and archaeological impact.

Where planning consent for a route is required, information on drainage patterns will need to the included in the submission. It is important that the creation or surfacing of shared use routes does not affect drainage patterns important for the local ecology. This should be considered during an ecological survey.

## 5.3 Consultation

When new routes are being created, or where significant changes are being made to an existing route surface, consultation is essential to understand the needs of users, landowners and local communities, and to ensure that an appropriate surface is chosen. Various consultation processes exist already within local authorities that provide a useful link between users and the authorities. The most obvious of these links is through the Local Access Forum, who are able to advise on schemes and also provide a link to the wider community.

Parish and District Councils can be contacted to gather local opinion. Authorities can benefit from interdepartmental working to share knowledge of users' needs and strategic plans; for example, between Cycling Officers and Rights of Way Officers. In addition, many local authorities issue newsletters to residents which can be used to publicise plans and gather feedback.

## 5.4 Avoiding conflict

Research for the Countryside Agency found that conflict on shared use routes is infrequent, and that users change their speed and pattern (moving to one side) to accommodate other users [Countryside Agency, 2001]. However, by studying routes where conflict was known to occur, further research identified that structural issues such as route width and maintenance were important factors [Countryside Agency, 2003b]. This indicates that maintenance of surfacing and removal of vegetation to the full width, of the route, where feasible, will be helpful as measures to avoid conflict.

Care must be taken when considering the type of any surface provided, to ensure potential conflict is minimised. The appropriate selection of surfaces should be used to avoid conflicts. For example, surfaces which can encourage fast cycling speeds should be avoided for routes with steep gradients and poor forward and peripheral vision, or the surfacing should include chicanes or other features to reduce cycling speeds.

The research made the following recommendations to minimise conflict on shared use routes [Countryside Agency, 2003b]:

- Developing a Code of Conduct that details the rights and responsibilities of all user groups in order to reduce ambiguities surrounding issues such as right of way, passing etiquette, the meaning of bells, control of dogs, and the speeds that should be adopted for safety and courtesy. For example, the British Waterways Code of Conduct for All Users and the Code of Conduct for Cyclists, available at http://www.britishwaterways.co.uk
- Policing of shared use routes to ensure that users know they are actively managed.
- Placing information panels at the access points to shared use routes detailing the Code of Conduct as well as the contact person in the responsible agency for maintaining the route and to whom comments, complaints and reports of conflict should be directed.

## The British Waterways Code of Conduct

**Cyclists** You need a permit and information telling you which stretches are open to cyclists.

### LOOK AFTER YOUR WATERWAYS

- Avoid cycling where your tyres would damage thepath or verges (eg when they are wet or soft).

### CONSIDER OTHERS

- Give way to others on the towpath and warn them of your approach. Pedestrians have priority. A polite 'hello' and 'thank you' mean a lot.
- Watch out for anglers' tackle and give them time to move it before you try to pass.
- Dismount under low, narrow or blind bridges.
- Never race one another or perform speed trials.
- We recommend you obtain third party liability insurance and equip your bike with a bell or hooter.

### TAKE CARE

- Access paths can be steep and slippery. Join and leave the towpath with care.
- You must get off and push your cycle beneath low or blind bridges, and where the path is very narrow.
- We strongly advise against cycling the towpath after dark, but if you have to, use front and rear lights.
- Thorny hedge trimmings can cause a puncture. We recommend plastic-reinforced tyres.

**Only cycle on stretches where it is permitted. Check with the local waterway office or www.britishwaterways.co.uk.**

# 6 Budgets and Cost Considerations

## 6.1 Summary

Available budget is usually the greatest constraint on the selection of surfacings for shared use routes. It is preferable to apply for additional funding to achieve a surface that minimises whole life costs, suits the environment and character of the route, and meets users' needs, rather than using less expensive materials with a shorter life-span, which do not suit the route or its users. If the available budget is insufficient, smaller sections of work can be undertaken until the remaining budget is available, as along as a piecemeal approach can be avoided.

Costing of works should examine the capital and maintenance costs of the route surfacing. Without sufficient budget for long-term maintenance, the route will not provide the facility planned by the local authority or promoter and required by users.

## 6.2 Budgets

The first choice surfacing should be preferred over a lower cost, less suitable option. If the budget is restricted, consider a phased programme of work to provide the fit for purpose surface. Phasing could prioritise route sections which require urgent work, or tackle a reduced length of route, and complete the surfacing when more funding becomes available. It is important to understand that two forms of budget are required for shared use routes. These are:

- Construction budgets - the costs associated with the physical construction of the route.
- Maintenance budgets - the realistic costs to keep the route fit for purpose.

Only by considering both forms of budget when selecting a surfacing can the 'whole life costs' of the route be minimised. It should also be remembered that whichever surfacing is selected, other maintenance costs associated with the route will still be incurred, such as clearing vegetation, clearing drains and maintaining signs. Anecdotal evidence suggests that maintenance of the surfacing is only 30% of overall route maintenance costs.

When the costs of maintenance are considered during the planning of surfacing works, the requirements for effective maintenance, and its costs, are understood and it is more likely to occur. Opting for lower cost maintenance may initially offer a cost benefit, but ultimately may incur greater costs for remedial or repair works in the long-term.

## 6.3 Funding

Since highway authorities have a statutory duty to maintain the surface of most public rights of way, these activities will not be eligible for additional funding. Additional funding for shared use route construction may be available from authority budgets aimed at promoting non-vehicular access and more environmentally sustainable transport routes. Creative funding packages, sometimes through a range of partners, can provide for long-term maintenance by, for example, providing initial capital funding for a 3 year period, during which a group of maintenance volunteers will have been developed.

**Grant funding may also be available from, amongst others:**

**Rural Development Service**
www.defra.gov.uk/corporate/rds/default.asp

**English Regional Development Agencies**
www.englandsrdas.com

**Landfill Tax Credit Scheme**
www.ltcs.org.uk

**Aggregates Levy Sustainability Fund Grant Scheme**
www.english-nature.org.uk/about/alsf.htm

**The National Lottery Funds**
www.lotterygoodcauses.org.uk

**English Woodland Grants Scheme**
www.forestry.gov.uk/ewgs

**Sport England**
www.sportengland.org/index/get_funding.htm

Photograph courtesy of the National Trust (www.nationaltrust.org.uk)

Flying materials to maintain and repair remote routes

## 6.4 Costs of construction and maintenance

Construction and maintenance costs vary widely, depending on the type of route construction and its location and access. For example, indicative costs for soil inversion (soil reversal) route construction in the Lake District can be in the order of £6 per linear metre.

In remote access areas the use of specialist plant and equipment will have a significant effect on costs, but allow works to be carried out where otherwise this would not have been possible.

The costs of flying materials to site by helicopter is about £30 per tonne, but this is often quicker, less expensive, causes less damage and has fewer health and safety implications than alternative transport methods.

For more conventional shared use route construction (such as unbound or sealed surface construction), indicative costs range from £20 to £50 per linear metre. Further details for various surface construction and maintenance costs are provided in Appendix A.

**Indicative costs for construction and maintenance of various 2.5 m wide surfaces on the Camel Trail in Cornwall are:**

| Surface | Construction cost | Cost when maintenance required | Maintenance scheme |
|---|---|---|---|
| Unbound – dust blinded sub-base material (45mm down) | £25/linear m | £5 to £15/ linear m | From cleaning to regrading to planing and re-blinding. |
| Sealed/dressed surface – Bitumen spay & chip on sub-base material (45mm down) | £31/linear m | £20/linear m | For making up sealed surfaces with planings and re-spraying with bitumen and surface dressing. |
| Sealed bituminous macadam on sub-base material (45mm down) | £55/linear m | | |

*Source: Cornwall County Council*

# 7 Decision-Making and Design Considerations

## 7.1 The decision-making process

This section of the guide consolidates the guiding principles and users' requirements for shared use routes from the previous Sections, to create this decision-making process. This Section also identifies some of the design considerations required for construction and maintenance.

As part of the consultation process undertaken for the development of this Guide, a series of focus group workshops were held throughout England. The purpose of the workshops was to involve maintainers, managers, users and landowners in:

- Identifying particular users needs.
- Establishing priorities in the decision-making process.
- Examining the factors considered when deciding a surfacing solution and the relative importance of these factors.
- Gathering knowledge on surfacing solutions and examining the positive and negative aspects therein.

The following checklist summarises the factors identified by the workshop groups regarding the decision-making process for surface selection of a shared use route.

The checklist is not presented in an order which must be strictly followed. Every individual situation will identify a priority in which specific questions should be answered.

Photograph courtesy of Green crescent photos

Photograph courtesy of the National Trust (www.nationaltrust.org.uk)

# Establish the scenario for the shared use route

### What is the legal status of the shared use route (select those that apply)?

☐ Footpath ☐ Bridleway ☐ Cycle Track ☐ Restricted Byway ☐ Permissive ☐ Private Rights

### What is the setting for the shared use route?

☐ Urban ☐ Urban – Rural Fringe ☐ Rural

### What is the general intended purpose of the shared use route (select those that apply)?

☐ Utility (including commuting) ☐ Recreation (not to a specific destination) ☐ Leisure (to a specific destination)

# Establish the local environment and conditions for the shared use route

### What is the current condition of the existing/proposed shared use route?

- Is there a route priority?
- What is the available width, alignment, gradient, topography, natural ground material, and existing surface type (if any)?
- Carry out an assessment of the route – e.g. climate, gradient, ground and surface conditions.

### What are the user requirements for the shared use route?

- What are the daily, weekly and seasonal timing of user flows, and levels and type of use, both current and potential?
- Are surfacing requirements different for certain user groups (and can a compromise be achieved?)
- Ensure any potential constraints to users are minimised (i.e. all ability access).

### What are the potential environmental, ecological or archaeological impacts of the shared use route surface?

- Ensure ecological, habitat and conservation considerations have been addressed. Consult with relevant statutory/non-statutory nature conservation bodies and where necessary seek professional ecological advice for appropriate survey and assessment support.
- Check if surfacing or surfacing works will impact on ancient monuments or sites of archaeological or historical interest, or locally important heritage features. Carry out a survey if necessary.

### What are the drainage characteristics for the shared use route?

- Is the existing drainage effective?
- Implement pollution prevention during and after construction.
- Minimise immediate and long-term impact on groundwater table.

# Establish planning status of the shared use route and the need for consultation

### Is consultation required?

☐ Yes ☐ No

### Has consultation with public/users/landowners on surfacing option(s) been undertaken?

☐ Yes ☐ No

### What is the planning status? Is planning application/permission required?

☐ Yes ☐ No

### Are any other consents required to do the work?

☐ Yes ☐ No

## Establish the options for managing the surface of the shared use route

### What option(s) are most appropriate to the route?

☐ Do nothing or do little ☐ Restrict access ☐ Maintain ☐ Upgrade

Once you have made the decision which option(s) you would like to adopt for a particular route - for example, maintenance - you should consider the following issues.

### What are the budget and cost considerations for the shared use route surface?

- What is the available budget?
- Balance capital costs versus maintenance cost/maintenance schedules.
- Consider all maintenance requirements in budget forecasting.

### What are the option(s) for surfacing materials and construction/maintenance of the shared use route?

- Consider the durability of the surfacing over the whole life of the surface.
- Remember that the solution should not jeopardise the usage, and alternative routes should be provided when access is restricted.
- Consider the availability of suitable material and the utilisation of locally available materials
- The aesthetics of the surfacing should suit the surrounding area; consider landscaping to minimise visible impact if necessary.
- Use full depth construction.
- Are there seasonal constraints on construction?
- Plan timing of the surfacing works against popular usage times
- Avoid any sensitive period when birds or animals may be vulnerable to disturbance.

### What controls may be used to ensure appropriate use of shared use routes?

- What are the implications of the surfacing solution on future use?
- Will the surfacing encourage conflict or inappropriate use?
- Is there a Code of Practice for users/landowners?
- Can other influencing factors be managed; for example, surrounding vegetation, access controls, signage and lighting; dog fouling; potential for fly-tipping and other illegal usage.
- Remember that path furniture should be suitable and easy to use, and has road safety implications at intersections with the road network.

## 7.2 Design considerations

The following aspects of route design should be addressed as part of the decision-making process:

- Route alignment.
- Balancing earthworks requirements (import/export of materials, using local sources).
- Surfacing type and construction (full depth or partial).
- Segregation, barriers and edging.

Waymarking is not considered in this Guide; information can be found in the County Surveyors Society Countryside Working Group's 'Report on the Surfacing of Bridleways' [CSS, 2005]. Drainage aspects and surfacing type and construction are discussed in detail in Section 9.

Photograph courtesy of Sustrans (www.sustrans.org.uk)

A segregated route for cyclists and pedestrians

Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.com)

Surface erosion of a route on a gradient

### 7.2.1 Route alignment

The alignment of shared use routes should be designed to suit or enhance the local landscape and environment and be sensitive to the natural surroundings. The realignment of existing routes should only be considered when there is a beneficial reason for doing so, such as producing an alignment that blends better with the landscape or protects archaeological or ecological features.

When planning route alignment, if possible, design the route to make it interesting for users, and to minimise potential conflicts. Routes should ideally follow natural contours or existing desire lines, to avoid users creating new short cuts. Long linear lengths with steep gradients, should be avoided, especially in high rainfall areas prone to erosion.

### 7.2.2 Segregation

Shared use routes, with segregated sections for different users, do exist. Segregation can range from a physical kerb or verge between different surfacings, to a tactile or painted line on the same surface. Whether segregation is needed, and what form it takes, depends on the expected level and type of use and should be considered as part of route design.

Guidance on types and minimum widths for segregation are provided in the 'Greenways Handbook' [Countryside Agency, 2000], Sustrans' 'National Cycle Network - Guidelines and Practical Details' [Sustrans, 1997] and the Department for Transport's 'Adjacent and Shared Use Facilities for Pedestrians and Cyclists' (Draft for consultation) [DfT, 2004b].

The Greenways Handbook recommends that segregated paths be considered when:

- There are significant user flows.
- There are concerns for blind/visually impaired people.

The Department for Transport's draft publication [DfT, 2004b] recommends "a presumption in favour of segregation" of pedestrian and cycle traffic. Reasons for and against segregation are given as:

**Reasons to segregate a route**

- If high flows of pedestrians or cyclists are expected.
- If disabled people or other vulnerable users are likely to use the facility frequently.
- If there is sufficient width available.

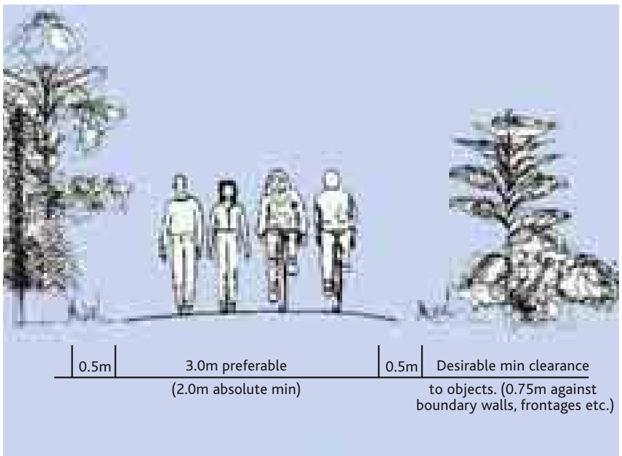
**Reasons to not segregate a route**

- If flows of pedestrians or cyclists are expected to be low.
- If flows of pedestrians in particular are expected to be very low.
- If disabled people or other vulnerable users are unlikely to use the facility.
- If there is limited width available.

For unsegregated cycling/walking routes, the Greenways Handbook [Countryside Agency, 2000], the Sustrans Guidelines [Sustrans, 1997], and the Department for Transport (DfT) draft publication [DfT, 2004b] recommend:

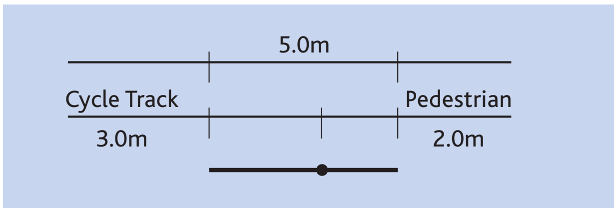
- A minimum width of 3 metres.
- An absolute minimum of 2 metres but only if traffic flows are less than 200 users per hour and there is a clear verge on each side of the route.

However, the Sustrans Guidelines [Sustrans, 1997] recognise that high cycling and pedestrian traffic flows can be accommodated on restricted width paths when the routes are delineated with a white line. Reference should be made to these guidelines for routes where smaller widths are available. Where segregation is not possible, but traffic flows are expected to be large, measures to encourage careful use must be included in the route design.




**The desirable widths of shared cycle tracks/footpaths [Sustrans, 1997]**

Canal towpaths and other routes by waterways can have a limited verge on either side of the route and are constrained by the waters edge. For cycling/walking routes on canal towpaths, the Sustrans Guidelines [Sustrans, 1997] recommend a minimum width of 2 metres for the route, with a clearance of 1.2 metres to the canalside; for example, to accommodate anglers or boat moorings. On towpaths, the route design needs to consider the construction of bank protection, such as tiebacks, piling and bio-engineering. Tiebacks must not jut into the towpath. Canal towpath work will normally involve British Waterways, who should always be consulted at an early stage (details provided in Appendix B).




**The desirable widths of shared canal towpaths [Sustrans, 1997]**

For segregated routes, the DfT draft publication [DfT 2004b] recommends a width for urban footways on local roads of 2 metres, which allows users with pushchairs or in wheelchairs to pass comfortably. The minimum acceptable width for a footway or footpath is 1.5 metres, which allows a pedestrian to pass a wheelchair user. An absolute minimum width of 1 metre is permissible if users are unlikely to need to pass or overtake one another. This absolute minimum should not extend for more than 6 metres along the route. Optimum widths for segregated pedestrian and cycling routes [Sustrans, 1997].

The minimum recommended width [DfT, 2004b] for a segregated cycle track on local roads is 3 metres. The minimum acceptable width is 2 metres. However, an absolute minimum width of 1.5 metres on a cycle track will allow users to pass one another with difficulty. This absolute minimum on a cycle track is not as onerous as the absolute minimum for a footpath or footway. The Sustrans Guidelines [Sustrans, 1997] suggest similar optimum widths for segregated cycling and walking routes.

For routes which carry horse-riders, the Greenways Handbook [Countryside Agency, 2000] recommends segregation from pedestrians and cyclists, and the provision of separate surfaces. For horse-riding routes, which can be segregated or shared use, the Handbook recommends:

- An optimum width of 4 metres, to take two horses abreast and allow passing.
- A desirable minimum width of 2.9 metres, which allows a horse to turn.
- An absolute minimum width of 2 metres. This absolute minimum should only be considered if there is an open verge, where traffic flows are low and where passing and turning are not necessary.

The British Horse Society suggests an ideal width of 5 metres for newly created or diverted routes, but confirms 4 metres as an optimum and recognises that many perfectly acceptable bridleways are 3 metres or less. It should be noted that, if the width of a route is proven, e.g. by inclusion in the statement accompanying the Definative Map, then that is the defined width (i.e. the minimum and the maximum). If the width of a shared use route cannot be proven, the minimum widths suggested may apply, not withstanding that actual space which may be available.

Tactile surfaces and raised dividing lines help blind and partially sighted people to position themselves and stay on the correct side of a segregated route [DfT, 1990]. Where raised dividing lines are used, care should be taken not to inadvertently create a trip hazard. The British Horse Society has some reservations about segregation, which could constitute a hazard on shared use routes.

### 7.2.3 Barriers

The use of barriers and physical segregation can be an obtrusive and unwelcome aspect of shared use routes. However, the occasional use of barriers may be required; for example, fencing stock control or balustrades on narrow under-bridge sections of canal towpaths. Barriers should not prevent access by mobility impaired users, whether on foot, in a wheelchair, on a pedal cycle, on horseback or driving a horse-drawn carriage.

There are circumstances - for example, where shared use routes intersect with busy roads - where access controls can increase the safety of legitimate users, making them aware of the road hazard and causing them to slow down. However, in general, the use of barriers as access controls should form part of the design considerations and be minimised wherever possible.

Photograph courtesy of CTC (www.ctc.org.uk)

**Example of route furniture designed to slow cyclists as they approach a road crossing**

Barriers are often used as access controls to prevent illegal use but this is often ineffective and causes inconvenience to the wide range of legitimate users. Regular use of shared routes by legitimate users can assist in minimising illegal use, thus eliminating the need for barriers. Route design can also minimise illegal use; for example, having convoluted and unattractive route entrances may minimise illegal motorcycling.

Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.co.uk)

**Example of barriers designed to prevent illegal use of a shared use route**

## 7.2.4 Edgings

The use of path edgings also needs careful consideration during route design and selection of surfaces for shared use routes. The requirement for edging depends on the local circumstances and should be assessed on an individual route surfacing design basis, not as a default component of route construction. Further details of edging can be found in [Sustrans 1999]. Edges can be essential to prevent lateral spread of surface materials, particularly unbound materials such a fibre reinforced sand or woodchips.

The unnecessary use of edging materials increases the costs of construction and may detract from the route aesthetics, giving the route an urban feel. Local authorities may specify the use of precast concrete kerbs as a matter of course, as a part of their local highway maintenance standards. Treated timber edgings can be used where the route aesthetics call for an alternative to precast concrete kerbs. The use of grass verges softens the visual intrusion of a route. Verges should slope away from the edge of a route surface to shed surface water.

If the route surface settles, edgings may become proud of the surface. Proud edgings keep water on the route and lead to ponding, erosion and scour, instead of promoting drainage and run off. Edgings proud of the surface may also become a trip hazard and the unnecessary use of edging should be avoided when the verges of a route are intended to provide the second surface on a dual surface route.

### Example of the appropriate use of edging

To replace existing routes which had been eroded, a smooth, firm, well-drained surface that blended in with the natural surroundings was provided using a sand and natural plant fibre mix. Edging boards were used to mark the outer edges of the route and contain the 100 mm thickness of the sand and natural plant fibre surfacing mix. The mix only required proof rolling, and provides a suitable shared use surface that can be seeded to provide a grassed surface, if required.
*Source: Suretrac*

### Photographs showing the edging of the route before resurfacing and after resurfacing

Photographs courtesy of Suretrac

### 7.2.5 Health and Safety

All construction and maintenance activities on shared use routes 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). Staff should have received training appropriate for the work they undertake. The Construction Industry Training Board (CITB) provides safety training and certification for engineers, construction staff, surveyors, manager and plant/machine operators (http://www.citb.org.uk).

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. Major resurfacing projects and route construction projects are likely to be covered by these Regulations.

The Health and Safety Executive provide guidance on these and other Regulations important to construction and maintenance activities (visit http://www.hse.gov.uk/construction). Other relevant Regulations include

- Manual Handling Operations Regulations 1992 (Statutory Instrument 1992 No. 2793)
- The Personal Protective Equipment Regulations 2002 (Statutory Instrument 2002 No. 1144)
- The Construction (Health, Safety and Welfare) Regulations 1996 (Statutory Instrument 1996 No. 1592)
- The Provision and Use of Work Equipment Regulations 1998 (Statutory Instrument 1998 No. 2306)

### 7.2.6 Voluntary work

Many organisations rely on volunteer input to undertake route construction and maintenance. Details of health and safety issues for volunteer groups can be found in 'Footpaths - A Practical Handbook' [Agate, 1996] and on the Waterway Recovery Group website (www.wrg.org.uk).

The site specific risk assessment associated should be assessed by a suitably qualified person, which could be a member of the voluntary group. Many voluntary groups, particularly those which carry insurance for their volunteers, have approved 'project leaders' who will take responsibility for overseeing the health and safety aspects of the work.

This project leader is responsible for briefing other volunteers and ensuring that the correct tools and protective equipment are available. The project leader will also have a supervisory role during the work, ensuring that protective equipment is being used and the work is being undertaken in a safe manner. If more than one work 'gang' is anticipated on any site, assistant project leaders will be needed.

In addition, project leaders should obtain and carry with them any permissions or consents required to undertake the work, such as consent from English Nature or British Waterways. It is prudent for project leaders to publicise the work so that users and adjoining landowners are aware what is being done, and when.

Volunteers contribute to site safety by behaving in an appropriate manner, and should adhere to the health and safety policy of the voluntary group they are working for. Volunteers must have realistic expectations of their own abilities, and not overextend themselves. They should make the project leader aware of any medical conditions, previous injuries or other issues which will affect the work they can undertake, or their ability to respond in case of an emergency, such as exiting an area if a fire starts or running to get help when there is an emergency.

# 8 Maintenance of shared use routes

## 8.1 Summary

The purpose of maintenance is to keep the route in a condition suitable for its intended use throughout its length, or to prevent impact on the surrounding landscape. Effective maintenance can also prevent major deterioration occurring and minimise the extent over which repairs are needed. The need for maintenance plant to access shared use routes should be included within the decision making process when considering the construction of the surface.

The decision-making process presents a series of options for the management of shared use route surfaces. These options are as follows:

- **Do nothing or do little** – (without compromising the safety of users)for example, minimum intervention may be appropriate for a route in poor condition if alternative routes in good condition are being promoted to take the traffic.
- **Restrict access** – for example, prevent access to protect a route through an ecologically sensitive environment.
- **Maintain, which is further subdivided as**
  Reactive maintenance, which addresses problems as they manifest, such as pothole repair.
  Planned maintenance, carrying out routine tasks which prevent problems occurring, such as clearing drains to prevent water ponding on the route.
- **Upgrade** – Placing a surfacing on a route with poor natural ground material that cannot support the traffic, for example. Information on upgrading the route surfaces is given in Section 10.

This section of the Guide covers aspects of minimal intervention, restriction and maintenance of surfaces for shared use routes.

The best practice guide, 'Repairing Upland Path Erosion' recommends that the following principles are accounted for when undertaking maintenance on routes in open country [Davies et al, 1996]:

- Repairs are only undertaken when required to prevent or ameliorate visual intrusion and environmental damage.
- Works should be of a high standard of design and implementation and use indigenous materials that are sympathetic to the immediate surroundings. The visual impact of the work should be minimal; for example, steps and straight line routes should be avoided.
- The existing vegetation should be protected and the methods of working should minimise the potential for damage. For example, it is preferable to fly machinery to site rather than to drive it over open ground. In most circumstances, only local plant species are used in restoration.
- As a general rule, the more remote, wild or scenic the route is, the greater the visual impact of the unsuitable works will be. The surfacing design in such locations needs to be evaluated carefully before any work is undertaken.
- The routes should be constructed to meet the intended use.
- All the alternatives should be examined. The best practice guide specifically states, "Before any repair work is agreed the question should be asked 'is there a better solution'?"

It is important to recognise that typically only 30% of maintenance costs for shared use routes relate solely to the surface. The remaining 70% of costs are related to other influences, such as drainage and vegetation management. The importance of effective drainage and the use of geosynthetic materials, that is geotextiles and geogrids, are two areas of overlap between maintenance and surface construction. Details of drainage, and the use of geosynthetics, are presented in Section 9.

## 8.2 Do nothing or do little

If the local situation warrants, it may be appropriate to do nothing to a route. For example, if:

- The route can sustain current traffic flows without intervention, but with monitoring of the surface condition if user numbers increase.
- There is only a small budget available and the route will not deteriorate further because traffic flows are reducing as alternative routes become more popular.
- The route is suitable for the majority of users and intervention would jeopardise their use.
- The route is an ecologically valuable habitat that intervention would damage.

- The route suits the character of the area and intervention would be visually harmful.

It should also be remembered that a strategy of doing nothing should not be to the detriment of the route. Minor repairs conducted in a timely manner (reactive maintenance) can prevent further route deterioration. For example, potholes in a surfaced route will pond water and users will in preference use the verge, potentially extending the damaged area, particularly if the verge cannot support the traffic.

In some areas where historic roads have been left unmaintained for a number of years, an excellent surface for shared use routes can develop. This type of route has strength and drainage provided by the original road construction, with a thick covering of grass resulting from natural processes of sedimentation and re-vegetation. This can create a surface suitable for use in all weathers. Improved grass cover may be better for the horse-rider, walker and mountain biker, although not necessarily suitable for the casual cyclist. Re-vegetation of surfacings containing recycled asphalt planings will occur, if the material is not over-compacted.

### Example of a re-vegetated historic road in the North Pennines Area of Outstanding Natural Beauty

This photograph shows a moorland bridleway in the North Pennines, which has almost certainly developed on a stone base of a historic track, probably an old road from former mining industry in the area. The track is engineered into the slope and is buried under soil and the grass sward. The route is typical of historic 'ledge' tracks in the northern uplands.

*Source: British Horse Society, North of England*

Photograph courtesy of Sue Rogers

### Example of re-vegetation of a recycled asphalt surfacing

It is important to recognise that overused routes may not be provided with sufficient opportunity to re-vegetate. Particularly in upland areas, worn away vegetation can result in topsoil being washed out, followed by significant route erosion, and the path becoming a scar on the landscape. However, minimal intervention, such as fertilising and reseeding with local species, may be sufficient to reinstate the route, or prevent significant erosion occurring on routes at risk of erosion [Davies et al, 1996]. Fertilising and seeding should normally take place at the beginning of the growing season.

Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.co.uk)

## 8.3 Restrict access

Access restrictions are difficult to enforce and unpopular with users. Advanced notice to disseminate information on closure should always be undertaken, as should notification when the restriction is lifted. Restrictions should not be considered unless safe alternative routes are available. These alternatives should also be publicised.

Deterioration of popular shared use routes can occur, the repair of which may often be best managed by allowing the route to be temporarily closed. Temporary diversions around areas that require maintenance or areas which have recently been maintained are also possible; for example, restricting the width of a route to avoid a recently seeded area.

Restricting access to shared use routes can be used to prevent route deterioration and ensure user safety (by prohibition). This approach can be used where the installation of durable surfacings is inappropriate but traffic levels are too high for the natural ground materials to support. For example, it may be appropriate to restrict access on one route leading to a popular beauty spot, diverting users to alternatives. Natural consolidation and re-vegetation of the closed route will occur, taking several years without intervention; a route does not quickly 'heal' itself. This approach of 'resting routes' is recommended by the best practice guide 'Repairing Upland Path Erosion' for routes which are usually wet or steep, and prone to erosion [Davies et al, 1996]. The guide also recommends fertilising and seeding to "boost" recovery.

Restricting access to divert users from areas which cannot sustain traffic because of their ecological or archaeological importance is also possible. However, if these restrictions need to be in place permanently, it is desirable to divert the shared use route, rather than just close it.

Under provisions of the Countryside and Rights of Way Act 2000 (yet to be commenced) English Nature will be allowed to apply for SSSI diversion orders if public use of a right of way is causing, or is likely to cause, significant damage to the flora, fauna, geological or physiographical features of the site. English Nature will only consider making applications for SSSI diversion orders if there is sufficient evidence that damage will take place, and if alternative measures, such as access restrictions, have been tried. Such diversions may only take place to protect the features for which the site is of special interest.

Upland areas subject to sheep grazing are vulnerable to the breakdown of vegetative cover, and to significant erosion. For the protection of the route, fencing may be required to stop grazing on the location, combined with a programme of fertilising and reseeding. Erecting fencing should be considered a temporary measure, and will be easier to implement with the consent of the landowner. Further details on fencing in upland areas are contained in 'Repairing Upland Path Erosion – A Best Practice Guide' [Davies et al, 1996].

## 8.4 Reactive maintenance

Reactive maintenance identifies and corrects problems and potential problems, by means of an inspection process. Reactive maintenance can include removing dog fouling or broken glass from routes when these issues are highlighted by concerned users.

A planned inspection process will involve surveying the route surface on a regular basis, the frequency of surveying dependent on the route location, its usage and its surface type. For example, the publication 'Lowland Path Construction' [Scottish National Heritage, 2001], suggests weekly inspection of a specific route surfaced with glass reinforced surface dressing, fortnightly inspection of a unbound 'blinding' surface and monthly inspection of surfacing in a woodland area. These inspections are an important part of a planned maintenance process, highlighting the maintenance required to prevent route deterioration.

Serious problems are often initially reported by users directly to the relevant authority or through the parish or district council. Immediate or full repairs are not always possible and temporary repairs may be undertaken. Sufficient warning should be given to users if temporarily unsafe surfaces are present.

'Quick fixes', such as redressing a surface layer, may provide effective maintenance in some instances, but if a repair is required every few years - for example, as a result of regular surface erosion - then more robust surfacings may be appropriate. Further details on the repair of erosion damage in upland areas (which also includes proactive maintenance, counter-erosion programmes such as re-vegetation) are available from the best practice guide 'Repairing Upland Path Erosion' [Davies et al, 1996] and the Lake District National Park Authority's Footpath Erosion Factsheet [LDNPA, Undated].

Harrowing or regrading the surface to provide a crossfall or a camber will encourage the route to shed water. This technique can be relatively inexpensive, costing less than £2.50 per linear metre [Scottish National Heritage, 2001]. It also reuses the in situ materials, avoiding the environmental damage of mineral extraction and haulage. However, these techniques can have only a short life span, can be aesthetically unattractive and the route may appear uncared for, thereby attracting misuse. Crossfalls are not preferred by wheelchair or pushchair users.

Infilling potholes can be cost effective (depending on the size of the hole), particularly if funds are limited. Infilling is a solution with minimal disturbance to the overall route. However, this technique does not provide a long-term solution as potholes will return if the cause has not been resolved. The use of reactive maintenance and inspection is usually used in combination with longer term planned maintenance schemes. For example, a temporary repair infilling a pothole is conducted to ensure a route can remain open, while a planned longer term solution is being arranged and implemented.

Further details on crossfall/camber requirements and pothole repairs are provided in Appendix A1 and A2 respectively.

## 8.5 Planned maintenance

Planned maintenance is carried out to prevent problems before they occur, as part of a regular maintenance schedule. Planned maintenance may include regular redressing and re-compaction of surfacing materials or removing litter or leaves from a route surface. Indicative costs are between £1.50 per square metre for redressing [Davis Langdon and Everest, 2004] and £0.10 per square metre for removing debris [Scottish National Heritage, 2001]. Surfacing maintenance is often best carried out in early spring, after any winter frost damage has occurred.

### 8.5.1 Vegetation management

Highway authorities have a statutory duty to control vegetation growing from the surface of shared use routes, and landowners have a duty to remove overhanging vegetation. Clearing vegetation helps keep the shared use route free of obstructions and can help the route surface dry out. Removing vegetation from the route verges and surrounding hedgerows allows the route to be used over the full width, rather than concentrating it in the centre of the route. This clearance often forms one of the most effective means of maintaining surfaces on shared use routes and should be incorporated as part of any solution. It also improves forward and peripheral vision and allows more light and air to a route.

Vegetation should be cleared to the full width of the route including verges, allowing maximum access, unless the verges are being maintained in a 'wild' state for ecological reasons. The Greenways Handbook [Countryside Agency, 2000] and the British Horse Society, recommend clearances of:

- 2.1 metres for pedestrians.
- 2.4 metres for cyclists.
- 3.7 metres for horse-riders*.

* The 3.7 metres recommended by the British Horse Society is an updated recommendation and differs from the 3 metres clearance recommended in the Greenways Handbook.

Vegetation management typically includes mowing and cutting regimes. Verge mowing should ideally be carried out twice a year, in the spring and again in late summer. On waterways, the verge between the water's edge and the towpath will need to be maintained to suit circumstances. British Waterways pledge to cut these verges prior to the boating season, except in ecologically sensitive areas.

Trimming of shrubs and removal of overhanging vegetation should be carried out between the end of August and the beginning of April, to avoid the bird nesting season [Agate, 1996]. Care should be taken not to cause visual damage to hedges, or diminish the rural appearance of the route. The effects on wildlife should be minimised when maintaining vegetation. Hawthorns, and other sharp debris, should be cleared from the route surface after trimming, as even a few cuttings on a route can lead to punctures in cycle tyres.

Indicative costs for vegetation maintenance are [Scottish National Heritage, 2001]:

- Verge mowing - £0.20 per linear metre.
- Trimming shrubs - £0.20 per linear metre.
- Removing overhanging vegetation - £1 per linear metre.

Leaf litter on sealed asphaltic surfaces can present a significant slip hazard. Maintainers should regularly remove leaf litter throughout the autumn and early winter, particularly on utility routes and ensure that the leaves are removed (to compost) and cannot block drainage ditches and culverts. Leaf litter removal costs less than £0.50 per square metre [Scottish National Heritage, 2001].

## 8.5.2 Grass surfacing

Maintained grass surfaces (for example, along many field edge bridleways) can provide an excellent surface for walkers and horse-riders. They are good for routes with average usage but reinforced turf may be more appropriate for heavy traffic. These surfaces require regular harrowing, compacting and regrading to create a new crossfall or camber to shed water. Although surface restoration and drainage work may be required, the importation of surfacing material is not necessary. The clearing of drains and drainage ditches is an important aspect of route maintenance. Further details of drainage and drainage maintenance are provided in Section 9.

Trampling is desirable to maintain the grass sward and prevent scrub invasion. It is advisable to sow trampling resistant species and lush agricultural mixes. Advice should be sought from local specialists as to which grass species will be in keeping with the local ecology. If the right balance can be struck between trampling and plant growth virtually no maintenance will be required. Where space allows, an area of taller unmanaged wild flower rich verge can provide a useful grassland corridor that can potentially be used by hunting bats, small mammals, birds and invertebrates, especially butterflies.

Grassed gravel surfaces can provide a firm, hard wearing vegetated surface, requiring minimal maintenance, which can be relatively cost-effective compared to unsealed surfaces and provide a rural appearance. However, grassed gravel may not be suitable for some cyclists, wheelchair or pushchair users and may resemble an agricultural access track. Details of grassed gravel construction are provided in Appendix A3.

An example of a typical maintenance schedule for a variety of tasks relating to shared use route maintenance is given in Scottish National Heritage publication 'Lowland Path Construction' [Scottish National Heritage, 2001].

Photograph courtesy of BHS Sue Rogers (www.bhs.org.uk)

Grass surfacing

## 8.5.3 Control of notifiable weeds

Advice on the removal of invasive weeds can be obtained from the Environment Agency, which is tasked with providing advice on the removal of notifiable weeds. Of particular importance to shared use routes are:

Japanese knotweed (Fallopia japonica) is a particularly invasive perennial species and can grow up through hard surfaces such as asphalt. It is commonly found along railway lines, riverbanks, roads and footpaths.

The ingestion of ragwort (Senecio jacobaea) can cause horses to go blind and die. Landowners have a legal duty of care to control ragwort on their land.

Giant Hogweed (Heracleum mantagezzanium) produces UV sensitive sap that reacts with sunlight and can cause burns and blistering.

# 9 Drainage and geosynthetics

## 9.1 Summary

Consultation at focus group workshops identified the single most important factor regarding shared use route surfacing performance is the provision of adequate and effective drainage. Maintaining existing drainage, upgrading existing drainage or incorporating new drainage can increase the longevity of route surfacings and achieve better value for money from the route. Drainage design should accommodate the removal of surface water, and intercept and keep the water away from the route surface by the use of appropriate drainage systems. Drainage systems should be regularly monitored and evaluated, to ensure that their condition does not deteriorate. This Section discusses drainage design and maintenance, and indicative details for drainage specifications are given in Appendix A4-6.

Geosynthetics provide opportunities to reinforce the surfacings of shared use route and increase their longevity. They can enhance value for money by reducing surfacing thicknesses, material haulage and handling on site. Geosynthetics are also discussed in this Section.

## 9.2 Drainage design

For all drainage, it is important to ensure that the capacity of the drainage system will be sufficient to cope with the likely amount of surface water run off. The availability of outfalls into an existing land drainage system will affect the type and size of drains that need to be accommodated. Where outfalls are widely spaced or not available, drainage schemes need to enable water to be stored while it slowly disperses. The use of sustainable drainage systems should be considered. These allow surface water to collect in site features where it drains away naturally, providing water storage to prevent local flooding, improving visual interest along the route and potentially creating a new habitat.

Drainage works should not contravene legislation covering drainage discharge into controlled waters. Advice on drainage design and works should be sought from the local authority's engineering department together with the relevant regulating agencies, such as the Environment Agency and local water service company.

When designing and maintaining drainage, care should be taken not to affect the existing local hydrology and resultant drainage characteristics of local habitats and advice should be sought from the local authority ecologist or a suitably qualified independent ecologist.

The construction of a shared use route can affect local drainage; for example, if the construction involves foundations and changes to the sub-soil. Route surfacings should be selected to minimise the impact on ecosystems reliant on the local drainage characteristics, such as affecting local vegetation by lowering the water table. A study into the effects of surfacing systems on the ecosystem has formulated four classes of sealing, with asphalt, concrete and paving stones having an extreme effect; and grass, gravel and crushed rock having a low effect [Senate Department for Urban Development, 1993].

There may be scope for habitat improvement or creation if drainage is managed sensitively. For example, the creation of wet drainage ditches either side of a route, vegetated by common reed (Phragmites anstralis) provide a potential haven for a range of wildlife including birds such as reed bunting and sedge warblers, water vole and many invertebrate species.

Where drainage grids are used in the surface of a shared use route, they should be flush with the surfacing and their slots should be aligned across the route so as not to inadvertently trap cycle tyres.

| The four sealing classes based on their effect on ecosystems [Senate Department for Urban Development, 1993] | | |
|---|---|---|
| Sealing class | Estimated effects on ecosystem | Sealing type |
| 1 | extreme | Asphalt, concrete, paving stones with joint sealer or concrete substructure, plastic materials |
| 2 | high | Artificial stone and plates (edge length > 8 cm), concrete-stone composites, clinker, medium and large-sized paving stones |
| 3 | medium | Small and mosaic paving stones (edge length < 8 cm) |
| 4 | low | Grass trellis stones, water-bound cover (i.e. ash, pebbles, tamped ground), crushed rock, gravel |

## 9.3 Drainage systems

Drainage systems tend to fall into the following categories:

- **Longitudinal open ditches**

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

Swales are grassland depressions, which lead water overland from the drained surface to a storage or discharge system. When compared to a conventional ditch, a swale is typically shallow and relatively wide, providing temporary storage for storm water and reducing peak flows. During dry weather a swale will be dry.

- **Transverse grips**

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

Where the verge forms part of a dual surface route for horse-riders, walkers and other users, transverse grips should be avoided as they create breaks in this dual surface.

Photograph courtesy of Sustrans (www.sustrans.org.uk)

Example of a swale

Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.co.uk)

Example of a transverse grip

- **Cut-offs**

These are most commonly used on sloping footpaths to divert water flowing down the surface to the sides of the route. They act as a barrier to water flow down slopes and are raised above the surface of the route. The primary use of these drains is to control scour by shortening the distance water flows along the route surface.

- **Enclosed drainage systems**

If there is insufficient width available, or if the ground conditions are unsuitable for longitudinal ditches, an enclosed drainage system may be used.

A piped French drain (a porous pipe in a stone-filled trench) may be effective for draining both surface and sub-surface water.

French drains collect surface run off and allow it to disperse into the natural ground materials, making them unsuitable where the natural ground material is weakened by the presence of water (for example, clays). French drains are prone to becoming clogged with fines.

Photograph courtesy of Sustrans (www.sustrans.org.uk)

Example of a French drain system being laid

- **Culverts**

Culverts are sealed, enclosed drainage systems which carry water flow under a route. In some areas, relief culverts may be required to control the build up of water in ditches (dependent on the permeability of the surrounding ground). They can be pipe or masonry structures and, as a general principle, they should be as large as possible.

Wildlife provision and access for drainage maintenance should be considerations when designing a drainage system.

## 9.4 Drainage maintenance

Flowing water on a route can damage the route's surface, which in turn results in higher maintenance costs and deters use. Ensuring the surface has an adequate cross fall or a camber will encourage the route to shed water. Drainage systems also need regular maintenance to ensure debris, leaf litter and vegetation are cleared from drainage ditches and that silt is removed from catch pits and culverts. Silt and vegetation should be disposed of carefully, to avoid material quickly re-entering the drainage system. Ideally, drainage maintenance should be carried out prior to winter, and again immediately afterwards, where possible maintaining some habitat for wildlife. Indicative costs for these maintenance activities are [Scottish National Heritage, 2001].:

- Clearing drainage ditches – £0.5 to £1 per linear metre.
- Emptying catch pits – £5 per pit.
- Clearing culverts – £15 to £50 depending on the size of the culvert.

## 9.5 Geosynthetic design considerations

Exposed geosynthetics can shred and become a trip hazard for walkers and horses' hooves. Surfacing layers should be sufficiently thick to not expose the underlying geosynthetic, with a minimum thickness of 100 mm – 150 mm recommended.

When using geosynthetics, care should be taken in planning the construction sequence to avoid damaging the material. Manufacturer's guidelines should be used to ensure adequate cover, lap dimensions and jointing design. Further details on the use of geosynthetics are provided in 'Footpaths - A Practical Handbook' [Agate, 1996].

## 9.6 Uses of geosynthetics

In the same way that the effective use of drainage is an essential part of both the construction and maintenance of shared use routes, geosynthetics may be used in a wide range of construction and planned maintenance applications. The use of geosynthetics can enhance shared use routes, often resulting in improved durability and prolonged operational life layers, which will assist in reducing maintenance. There are essentially three main uses for geosynthetic materials:

- Separation of materials.
- Strengthening and reinforcement.
- Erosion protection.

**Separation of materials**

Geotextile separators are thin sheets which contain numerous tiny openings that permit drainage whilst preventing the passage of fines. The general function of a geotextile is to act as a separator between different layers of materials, but they may be used as filters to drainage systems and for weed suppression.

Separators are commonly placed on top of the natural ground materials, before the placement of route surfacings. Their primary functions are:

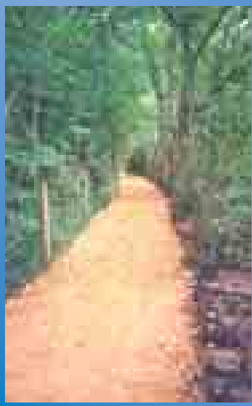
- To prevent fines migration up from the natural ground materials into the surfacing, known as 'mud pumping'.
- To prevent mixing of the natural ground materials with the surfacing when it is compacted.

Geotextile separators are relatively easy to handle and perform best on a level surface which is well-drained and free from sharp objects. Typical costs for geotextile separators are £1 - £2.50 per square metre [Davis Langdon and Everest, 2004].

It should be noted that on routes prone to invasive weeds where treatment with weed killer is inappropriate, weeds caught in the geotextile will be difficult to remove without damaging the geotextile. In these circumstances the use of a geotextile separator may be inappropriate.

In general, non-woven or needle punched geotextile separators do not provide significant reinforcement, although some woven geotextiles and composite geotextile/geogrid materials can act as both a separator and reinforcement.

### Example of the use of geosynthetic textile for separation



This bridleway has been resurfaced with 'softer' oolitic limestone. Although weak compared to harder limestones it has some cementing properties which improve its durability while still providing a surface suitable for horse-riding. A geotextile separator, laid underneath the surfacing, prevents 'mud pumping' and mixing of the oolitic limestone with the natural ground materials. The separator increases the longevity of the surfacing and will also provide some degree of reinforcement to the surfacing, although this is not its primary function.

*Source: Mendip District Council*

Photograph courtesy of Mendip District Council (www.mendip.gov.uk)

**Strengthening and reinforcement**

Synthetic geogrid reinforcement (plastic mesh) comprises relatively large openings and provides structural reinforcement of aggregate layers by means of mechanical interlock. Geogrids range in thickness and performance from thin rolls of flexible synthetic grids, through to large stiffness units that are infilled with the aggregate.

When placed on poor natural ground materials, geogrids can:

- Prolong the life of the planned overlying aggregate layer.
- Allow a reduction in the thickness of the overlying aggregate layer without reducing planned life.
- Be used to provide thicker, aggregate filled layers that increase the route's stiffness and ride quality.

Typical costs for geogrid reinforcement are in the order of £2 to £4 per square metre [Davis Langdon and Everest, 2004].

**Erosion protection**

Erosion protection geotextile fabrics have been developed to provide reinforcement for topsoil so grass can take a better hold. The application method is similar to geotextiles, however, reinforcing fabrics can be pinned down with steel pins. Reinforcing fabrics can also be used to seed grass.

# 10 Shared use surface construction

## 10.1 Summary

Appropriate surface construction should provide a suitable surface for all users. Surface construction is important for new shared use routes, but also has a role in planned maintenance, which often requires some form of upgrade to the surface. This Section of the guide presents details of the sources of materials, and their use as surfacing materials. The initial focus of this Section is the options for reuse and recycling of materials. The Section concludes with a discussion of unbound and sealed surfacings that can contain recycled materials if appropriate.

As route specific requirements will be influenced by local circumstances, only generic guidance can be provided in this Guide. Indicative details on various types of shared use route construction are provided in Appendix A.

## 10.2 Construction layers

Conventional construction of all shared use routes generally comprises up to three discrete layers:

- Surfacing layer or surface dressing – The top surfacing layer in intimate contact with the user. Selection factors include appearance, smoothness and durability.
- Sub-base layer – The structural part of the route providing strength to the construction and transferring loads from the surface to the formation layer.
- Formation layer – The prepared ground on which the sub-base is laid. This may be the natural ground materials or a geosynthetic layer.

As a minimum guide, the depth of each layer should be at least twice the size of the diameter of the aggregate used; for example, if using 20 mm gravel then the minimum layer thickness is 40 mm [CSS, 2005]. However, the required thickness for each of the layers will vary depending on:

- The type of surface construction, that is unbound or sealed.
- The traffic expected over the shared use route; for example, a cycle track with high pedestrian and cycling traffic flows, or a bridleway with low traffic flows, but composed mostly of horse-riders.

## 10.3 Materials selection

As a general principle, priority should be given to the following hierarchy of use:

1 The reuse of in situ materials, as this avoids the environmental and financial costs of using material from non-renewable resources, its haulage to site and the costs of disposal of excavated wastes.

2 The use of recycled materials, as this minimises the use of non-renewable resources.

3 The use of primary materials.

It is important to recognise that local primary materials may be the most consistent with the local environment. In some instances, materials may be available at a nominal charge, or provided free by a landowner or maintainer; minimising the costs of material haulage.

Leaching from inappropriate materials can damage nature conservation interests, perhaps by changing the pH of the surrounding area or by leaching heavy metals. Leaching of contaminants can occur from any material, whether from non-renewable primary resources or recycled, locally sourced or imported resources. For example:

- Limestones can contain leachable lead.
- Limestone and cement can increase the pH of the surrounding area.
- Cadmium and chromium are found in some slags.

It is the concentrations of contaminants that are leached from the construction materials that are important, not the total levels of the contaminants present, as not all the contaminants will be available for leaching. An overview of leaching, specifically related to recycled and secondary aggregates, can be found in the AggRegain 'Environmental Information Sheet - Unbound aggregates used at or below ground level' [AggRegain, 2004].

## 10.4 Reused materials

There are various ways that materials may be reused on a route. Existing prepared layers may be used, soil reversal or soil inversion, and the process of soil stabilization.

### 10.4.1 Railway corridors

Many shared use routes utilise old routes that provide pre-existing prepared formation and sub-base layers. The Sustrans publication 'Making Ways for the Bicycle' provides details of shared use route construction on railway corridors, and canal towpaths [Sustrans, 1994].

### 10.4.2 Soil reversal

Soil reversal or soil inversion (also known as 'machine dug' paths) has proved to be very successful in creating shared use routes across poorly drained moorland or hill country, and in forests. Suitable material is excavated from drainage ditches to one or on both sides to form a raised surface, providing strength and improved drainage. Excavated ditches are lined with the excavated top soil and turfs to minimise visual impact. The profiles of such ditches can be softened to provide a range of ecological niches.

Soil reversal can provide a cost effective surface for most users. Its use is limited by the available width of the route and the natural ground materials; it is not suitable for solid geology. The technique enables natural drainage to develop on one or both sides of the route and does not rely on the use of imported materials. However, soil reversal can cause temporary disruption to the route during construction and requires the use of specialist excavation plant. Further details on soil reversal/inversion are provided in Appendix A7.

#### Example of reused former railway corridor

The Cuckoo Trail in East Sussex is a shared use route over a former railway corridor. The route is open to walkers, horse-riders and cyclists. The surfacing typically comprises a base course of 100 to 150 mm thick rolled asphalt planings or 40 mm scalpings, with a 20 mm thick surface of limestone dust. The verges of the route are built up 75 mm.

*Source: British Horse Society*

Photograph courtesy of Sustrans (www.sustrans.org.uk)

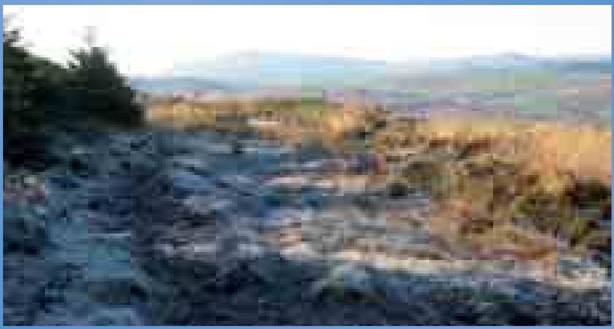
## Example of soil reversal

A 2 km section of bridleway at Park A Moor above Coniston Water was in a wet, boggy state, with two horses having to be destroyed after getting stuck in the mire. Cyclists and walkers had to negotiate deep bogs. The bridleway skirts a SSSI, so it was important that restoration of the bridleway did not alter the hydrology.

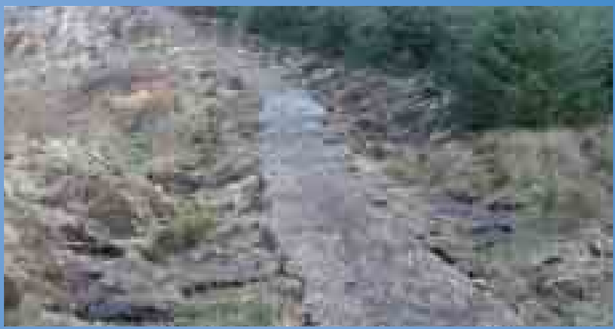
In March 2003, the affected 2 km of route was repaired using a soil reversal, at a cost of £6.50 per linear metre. The work took about 6 weeks to complete. The route remained open, but signs asked people not to use the new surface until it had consolidated – typically a few days. At the end of each day, the new surface completed that day was seeded with a seed mix, approved by English Nature for use in the uplands and on SSSIs. This seeding helped to 'feather' the edges of the path very quickly to aid the blending of the route into the landscape.

Source: The National Trust Photographs courtesy of the National Trust

### Before



### After



### One year after

### 10.4.3 Stabilised materials

Soil stabilisation is a technique to improve formation layers so that they behave as sub-base layers. This avoids the need to import large volumes of aggregates before the surfacing layer can be placed.

Alternatively, the stabilised formation layer can provide a natural surface layer. As a surface layer it can retain a reasonably natural appearance, although it may not be sufficiently robust enough for increased user traffic. It is not necessarily a smooth surface and may not be favoured by utility cyclists.

Stabilisation involves the intimate mixing of the soil with a cementing binder, followed by watering and compaction. The amount of binder, degree of compaction, nature of the soil and efficiency of the mixing will determine the success of the technique.

Between 2% and 8% by weight of cement is commonly used, which is rotovated into the top layer, watered then compacted to finished levels. Clay may be treated in this way, although larger proportions of cement are needed. Alternatively, 2% to 5% by weight of lime can be used with clay, although the strength gain with lime is generally slower than with cement. Alternative binders from recycled sources can be used, such as ground granulated blast furnace slag or pulverised-fuel ash, as can polymeric admixtures.

Small-scale operations tend to involve surface spreading of an appropriate binder on top of the ground, before rotovation, watering and compaction. The depth of mixing is generally restricted to a maximum of 150 mm.

Limitations of the technique include:

- Suitability of the soil: It is not suitable for use with high plasticity clays and organic soils or soils with an high sulphate content.
- The local ecology: Cement binders have a high pH and may be unsuitable in certain areas; for example acid heathlands.
- Availability of water: Sufficient water is required for the cementing reactions to occur without the material being too wet to compact.
- Temperature and weather: The colder the temperature, the longer the cementing reactions take. This could delay the time before the route can be re-opened. Operations should be suspended during periods of rain and frost to prevent damage to the stabilised material.
- Construction planning: A maximum duration of two hours between spreading cement binder and the final compaction of the material is recommended and care should be taken to plan the works efficiently.

## 10.5 Recycled materials

Recycled aggregates are widely available across England and they should be used in preference to the use of aggregates from non-renewable resources. The AggRegain website (www.aggregain.org.uk) contains a directory of suppliers of recycled and secondary aggregates and should be consulted to determine local availability.

However, although a recycled aggregate may have the required technical properties for use in shared use route, this does not infer environmental quality. The Environment Agency considers that waste which is recycled as aggregate (such as crushed concrete or asphalt planings) only stops being waste 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 Waste Management Licensing applies to the transport and handling of these materials.

However, 'The Quality Protocol – for the production of aggregates from inert waste' [WRAP, 2004] sets out a quality production regime for reprocessing of materials, after which the material is "probably" no longer a waste. This Quality Protocol was produced jointly with the Environment Agency. This means that recycled aggregates produced using a quality regime can be transported and handled in the same way as aggregates from non-renewable resources.

### 10.5.1 Recycled asphalt

Recycled asphalt is suitable for use in shared use routes. However, recycling into new road asphalt is a more appropriate and sustainable option if local recycling facilities are available. It is possible that the use of recycled asphalt at the surface of a shared use route will be aesthetically inappropriate, as it gives the route an 'urban' feel.

Modern asphalts are made with bitumen rather than tar, and thus are inert and suitable for recycling. However, it is possible that some road planings, particularly those from old roads, may contain tar. Hence, the provenance of any materials should be established before they are used.

Photograph courtesy of Devon County Council (www.devon.gov.uk)

Example of recycled asphalt surfacing

#### Examples of use of recycled asphalt planings

For many years the Three Points Lane Bridleway, Buckinghamshire, was heavily waterlogged all year round and overgrown, making it difficult to use. In 2004, Buckinghamshire County Council used several tons of loosely compacted road planings to upgrade the route. The new surface is user friendly for walkers, cyclists and horse-riders, and blends in with the locality.
*Source: Ramblers' Association*

Leicestershire County Council completed the resurfacing of 1.2 km of 3 m wide route using 200 mm of recycled asphalt compacted over a geosynthetic membrane, topped with 25 mm of granite dust. The recycled asphalt was £1 per tonne less than the alternative from non-renewable sources. Similarly built routes constructed about 3 years previously are in good condition.
*Source: Cheshire County Council*
*[Cheshire County Council, 2004]*

### 10.5.2 Crushed concrete and brick

Quality controlled crushed concrete and brick provide a highly durable sub-base layers appropriate for multi-use routes and can be cost effective if available locally. However, both materials may contain lime and may not be suitable for pH sensitive environments. Crushed concrete is also suitable for use as an aggregate in higher value applications, such as an aggregate in asphalt or new concrete. These recycling options should be preferred in locations where appropriate recycling facilities exist. Further information on recycling facilities and their intake materials can be found at:

- http://www.ciria.org/recycling
- http://www.smartwaste.co.uk/bremap.jsp

### 10.5.3 Quarry wastes

Quarry wastes can provide a good source of surfacing materials. Limestone dust is used widely as a surface dressing. Its fine size and cementing properties provide a smooth, strengthened surface. However, it can be susceptible to frost heave and may not be robust in the long-term. It is known to wear at an approximate rate of 3 mm per year and requires regular renewal. It can also be sharp underfoot and unsuitable for horses. As a naturally alkaline material, it should only be used in areas with appropriate background pH levels.

China clay waste is a suitable aggregate for shared use routes in the south west of England. Waste aggregate from sandstone quarries has been used successfully on bridleways and canal towpaths. Slate waste can also be used on the North Wales borders but it is sharp and angular and may damage horses' hooves, and is not ideal for surfacing cycle tracks.

### 10.5.4 Industrial wastes

Other industrial waste materials include slags, ashes and spoils. Many of these may be suitable for shared use route construction, although blastfurnace slag and phosphoric slag are premium aggregate materials commanding a high market price. Steel slags may expand with weathering, causing disruption to the route surface. Burnt colliery spoil (red shale) has been successfully used for shared use routes.

#### Examples of industrial wastes as surfacing materials

Burnt colliery spoil has been used (currently and historically) for the National Cycle Network through the forests in Nottinghamshire, providing a surface which blends in well but can be prone to rutting and water damage.
*Source: Sustrans*

The use of burnt colliery spoil has been promoted by English Nature as a sub-base material. It has been successfully used in Epping Forest, dressed with pulverised-fuel ash, furnace bottom ash or other cinders, or as a surface itself.
*Source: British Horse Society*

### 10.5.5 Woodchips

Recycled woodchips are widely available across England, as are products from sustainable timber resources. Sources of recycled wood products for route surfacings can be found on the Recycle Wood web site (http://www.recyclewood.org.uk). Woodchips can provide a soft, aesthetic surface for shared use routes, but are only effective if they are kept dry. They work on free draining ground, preferably separated with a geotextile separator. Woodchips should not be used on clay, where they may become waterlogged, slippery and quickly degrade, nor should they be used in exposed, windy locations (where they will rapidly blow away). Further details of shared use routes using woodchip surfaces are provided in Appendix A8.

Woodchips will probably need to be replaced annually and unless as plentiful supply of free material is available on an annual basis, this surfacing will incur high maintenance costs.

#### Example of use of woodchips

Aldbury Bridleway No. 56 (Hertfordshire) and Little Kimble Bridleway No. 28 (Buckinghamshire) were improved with ground-up tree bark and conifer trimmings. The improved surfaces have created mud-free routes, which are pleasant to use by horse-riders and walkers.
*Source: The Ramblers' Association*

## 10.6 Unbound sub-base layers

Unbound layers are made up from graded aggregates and rely on particle interlock for strength and durability. These aggregates can be made up of recycled or traditional aggregates. Unbound aggregates usually provide a very good path surface for routes with a gradient of less than 1:4 (25%). Unbound surfaces on these shallow gradients can be easily maintained and are popular for users, providing a durable long-term surfacing solution. However, construction is more expensive than in situ techniques and this approach can be visually intrusive if inappropriate materials are used. Surfacings are ineffective unless combined with appropriate drainage, which should be a primary consideration when specifying any route surfacings. Details of unbound aggregate route construction are provided in Appendix A9-10.

Large size materials, up to 100 mm in diameter, can be used to regulate the level of uneven ground before sub-base and surfacing layers are formed. They can be used as surfacing layers, but it takes many years for natural consolidation and re-vegetation to provide a surface suitable for most users.

Medium size materials, up to 63 mm in diameter, are used in sub-base layers. These can be placed directly onto the formation layer, which can be the natural ground, a geosyntheic layer or a layer of large sized material used to level the surface. Once a firm base has been prepared, the surface layer can be applied, either as an unbound surfacing or a sealed surface. Usually, the sub-base layer will be 100 mm to 150 mm thick. Smaller sized materials, up to 20 mm, can be used at the surface of the sub-base layer to form the route surface.

## Example of sub-base layer surfacing

One part of the surfacing of Byway 49 in Chieveley comprises fine gravel on a firm base. The original route was diverted from the definitive line in the 1990s, as a result of the development of a sand and gravel quarry near Newbury. The new route surface was provided with material supplied by the quarry, forming an excellent surface for walkers, cyclists and equestrians. The surface is soft and kind to horses and walkers, as it reduces concussion and helps maintain reasonable cycling speeds. It is not too soft to encourage fast horse-riding, either. The surface drains well and is quite firm and stable where it is underlain by sand. Part of the track is on a slope but this does not seem to cause any loss of surface
*Source: British Horse Society, West Berkshire*

The sub-base layer must be effectively compacted and levelled to good longitudinal profile and ride quality. The surface of the sub-base layer should be profiled to shed water, by providing either a crossfall or camber (see Appendix A1). Crossfall or camber should be checked using a camber board before the surfacing layers are applied.

### 10.7 Unbound surface layers

Surfacing layers should provide adequate cover to the sub-base layer, so that the route surface remains even. Usually an absolute minimum of 25 mm is required. A range of unbound surfacings are available including:

- Blinding
- Hoggin
- Stone

### 10.7.1 Blinding

Sand or dust sized material is used to provide a smooth surface for a route. It can be prone to rutting, and requires regular regrading (raking). These surfacings may not be suitable for routes that carry cyclists, wheelchairs or pushchairs, unless the blinding layer has some degree of binding, for example through natural cementing properties or the presence of clay. Without some binding properties, there may be a tendency for these surfacings to be dusty when dry.

## Examples of blinding as a surfacing

The Green Crescent is a shared use route for walkers, cyclists and riders which skirts around the western side of Burgess Hill. It delimits the edge of the town from the adjacent countryside and villages. These pictures show a section of the routes made up from a sub-base layer blinded with 3 mm to dust limestone fines. This specification will be used on further phases of the Green Crescent project.
*Photographs courtesy of Mid Sussex District Council (www.midsussex.gov.uk)*

## Fittleworth stone

Fittleworth stone, a fine-graded local stone, has also been used as a blinding for short sections of the route, in Nightingale Lane Meadows, the most southerly part of the Green Crescent. It performs reasonably well as a surfacing, is visually pleasing and is not too jarring for users. However, the stone is liable to be picked up on shoes and hooves after a frost.

Fittleworth stone needs to be kept proud of the ground; therefore, edgings have been dispensed with and the route was constructed above the ground rather than by excavating. The camber of the route is very good, allowing surface water to be shed, with good drainage channels laid alongside.

*Source: Mid Sussex District Council and Mid Sussex Area Bridleways Group*

### 10.7.2 Hoggin

This is a general term for material usually comprising rounded gravel with relatively high fines content. If the fines content is too high, then the material will be prone to softening and rutting when wet. Hoggin binds well when rolled and forms a firm surface. Hoggin can be very variable and its quality and consistency should be monitored during construction [British Horse Society, 1995].

### 10.7.3 Stone

Stone surfacing is visually attractive, with long-term durability and low maintenance, making it ideal for remote routes. Stone flagging and stone pitching are traditional techniques popular in areas with solid ground, where the stone is gathered locally and is visually unobtrusive. Although stone can be expensive to transport, particularly to remote locations, its durability, aesthetic qualities and reduced maintenance costs, compared to other surfacings, may reduce the whole life costs of the stone surfacing. Extensive details on both surfacing techniques are contained in 'Repairing Upland Path Erosion – A Best Practice Guide' [Davies et al, 1996].

Routes may need to be closed while work is undertaken, and this may be for several months. Ideally, the stone is gathered locally and consistent with the local geology so that it is not visually intrusive.

Stone flagging uses large flat stones on shallow gradients, often to float over peaty or boggy ground. The best practice guide 'Repair of Upland Path Erosion' notes that stone flagging is a regional technique which is probably inappropriate outside the Pennine and Yorkshire Districts [Davies et al, 1996].

Stone pitching involves placing large stones, with their flattest side up, to create small irregular steps which blend into the landscape. Pitching is commonly used for routes on steeper gradients, above 1:4 (25%), incorporating curves and natural rocky feature to help the route blend with the landscape. Once laid, any small gaps are infilled with soil. This soil is fertilised and seeded, to promote a natural appearance. Fertilising and seeding the ground either side of the route helps the surfacing to blend into the landscape and also to keep users on the route. Further details on the use of stone pitching are provided in Appendix A11.

## Two examples of pitched stone surfacings

*Photograph courtesy of the National Trust (www.nationaltrust.org.uk)*

*Photograph courtesy of Scott Wilson Pavement Engineering (www.swpe.co.uk)*

## 10.8 Floating paths

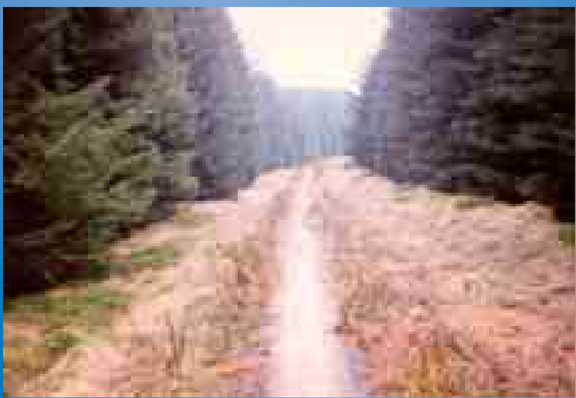
Floating paths are used on soft ground with high groundwater levels. They use natural separators, such as brushwood or geosynthetic materials as the formation layer to provide a 'buoyant' raft for the sub-base and surfacing. Even without seeding, this type of route may green naturally if the level of use is not too high. Flagstones can be placed without a separator as they 'float' on the soft ground.

Floating paths can provide cost effective shared use routes. Although installation requires only low skill levels, it can be labour intensive. They can be sustainable if they use local materials and are able to withstand maintenance access. Further details on floating paths are provided in Appendix A12.

### Example of a floating path

Floating paths form part of a shared use route from Kielder to Newcastleton through Kielder Forest and into Kershope Forest. It is much used by cyclists, although less so by horse-riders and walkers. The path in the photograph was constructed in the 1980s and is now more stable and is covered with more vegetation. It is suitable for horses to canter.

*Source: British Horse Society, North of England*



*Photograph courtesy of courtesy of Sue Rogers*

## 10.9 Sealed surfaces

Sealed surfaces are more durable than unbound surfaces as the use of a cement or bitumen binder contains the aggregate and maintains the integrity of the surface. They can provide a cost effective surface for shared use routes, particularly utility routes in both urban and rural environments. Further details of asphalt surfaces are provided in Appendix A13-14.

Sealed surfaces are a robust, proven, long-term solution and relatively easy to maintain by regular sweeping. This low maintenance should be considered as part of the whole life costing of the route. Asphalt (also known as bituminous macadam or 'bitmac') is strong and durable with bituminous surfaces lasting for more than 20 years. Concrete surfaces are also durable and can last in excess of 40 years. However, concrete is susceptible to frost attack if the surface if not properly constructed. Both asphalt and concrete surfacings should be machine laid on cycle routes, to ensure adequate longitudinal profile and ride quality is achieved.

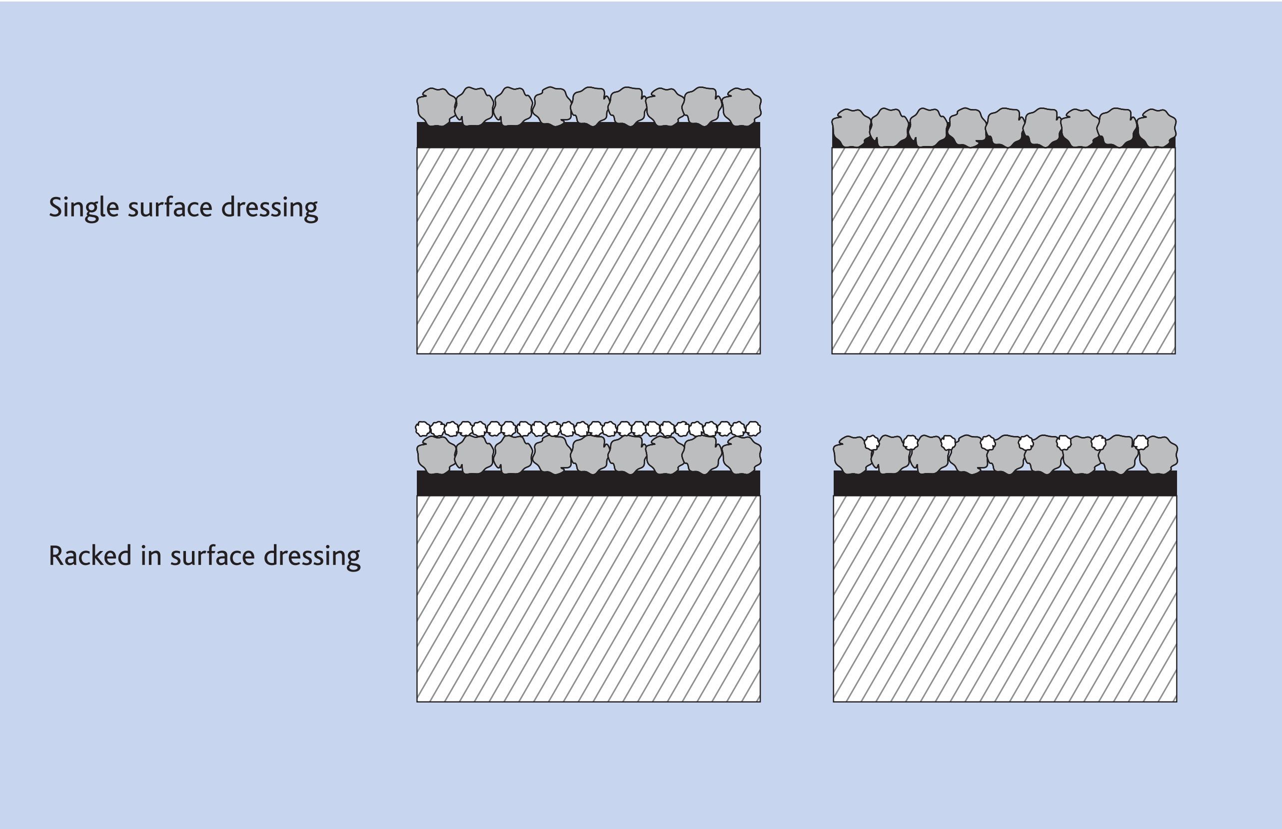
Sealed surfaces may not have the required aesthetic appearance to match the local landscape. This might be overcome by planting to obscure the route from scenic views. In general, sealed surfaces are rigid and not preferred by horse-riders and many runners, although they may be appropriate for use on short sections where routes cross vehicular access points. Sealed surfaces can be acceptable where a large grassy verge is available. Asphalt surfaces can be intrinsically slippery or become slippery when wet and covered in decaying vegetation.

### 10.9.1 Surface dressing

Surface dressing, also known as bitumen spray and chip, can be used to treat slippery sealed surfaces and can be cost effective for maintenance. It provides a compromise, providing a visually acceptable, natural aggregate appearance which wears well compared to unbound surfacings. The advantage of surface dressing is that the aggregate chips can be selected to suit both the local circumstances and local character. It is a much lower cost than asphalt surfacing but must be placed on a well compacted sub-base layer.

Surface dressing involves spraying bitumen over an existing surface (which may be sealed or an unbound surface) and rolling fine gravel chips to form a textured surface. Surface dressing can be laid by hand where space is compromised. The surface dressing should be swept after placing to remove excess, loose stones which can be a hazard to users.

Two forms of surface dressing widely used, 'single' and 'racked in', shown below [TRL, 2002]. Single surface dressing involves a spray of bitumen and single layer of aggregate chips. These dressings are sufficiently robust for most situations. Racked in surface dressings use 10% less chips, and a thicker bitumen coating than a single surface dressing. Smaller chips are used to infill between the larger chips, increasing the stability of the surfacing.




The sub-base layer will need to provide the crossfall or camber needed to shed water from the route. Surface dressing can last between 10 and 15 years, if the layer is appropriately placed and the structure is resistant to frost heave. It will loose its chippings under very heavy traffic, and the bitumen layer exposed will be slippery when wet. Further details of surface dressing are provided in Appendix A12.

Proprietary surface dressings containing glass fibre reinforcement have been used on shared use routes. A bitumen binder with glass reinforcement is laid, and then aggregates rolled into the surfacing. The glass fibre reinforcement enhances the crack and fatigue resistance of the surfacing.

# 10 References


Agate, E. (1996), Footpaths, A Practical Handbook, British Trust for Conservation Volunteers. Available at http://handbooks.btcv.org.uk.

AggRegain (2004), Environmental Information Sheet - Unbound aggregates used at or below ground level [online]. Last Accessed 26 June 2005 at http://www.wrap.org.uk

British Horse Society (1995), Guide to the Surfacing of Bridleways and Horse Tracks, 2nd Edition.

Countryside Agency (2000), Greenways Handbook [online]. Last accessed 23 June 2005 at http://www.greenways.gov.uk

Countryside Agency (2001), CRN32 - How people interact on off-road routes. Available online at http://www.countryside.gov.uk

Countryside Agency (2003a), A guide to definitive maps and changes to public rights of way. Available online at http://www.countryside.gov.uk

Countryside Agency (2003b), CRN69 - How people interact on off-road routes: Phase II. Available online at http://www.countryside.gov.uk

Countryside Agency (2005a), Managing public access – a guide for land managers. Available online at http://www.countryside.gov.uk

Countryside Agency (2005b), By All Reasonable Means: Inclusive access to the outdoors for disabled people. Available online at http://www.countryside.gov.uk

CSS (2005), Countryside Working Group Report on the Surfacing of Bridleways. Available online at http://cssnet.org.uk

Davies, P., Loxham, J. and Huggon, G. (1996), Repairing Upland Path Erosion – A Best Practice Guide, Lake District National Park Authority, National Trust and English Nature.

Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

DEFRA 2005, Making the Best of Byways – Apractical guide for Local Authorities managing and maintaining byways which carry motor vehicles, Second Edition (to be published).

DfT (1990), Traffic Advisory Leaflet 4/90: Tactile Markings for Segregated Shared Use by Cyclists and Pedestrians.

DfT (2004a), Policy, Planning and Design for Walking and Cycling (Draft for consultation). Available online at: http://www.dft.gov.uk

DfT (2004b), Adjacent and Shared Use Facilities for Pedestrians and Cyclists. (Draft for consultation). Available online at: http://www.dft.gov.uk

HM Government (2005), Securing the future delivering UK sustainable development strategy. Available online at: http://www.sustainable-development.gov.uk

LDNPA (Undated), Footpath Erosion Factsheet. Available online at http://www.lake-district.gov.uk

Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership (2001), Lowland Path Construction – A Guide to Good Practice.

Senate Department for Urban Development (1993), Berlin Digital Environmental Atlas - 01.02 Sealing of Soil Surface (Edition 1993) [online]. Last accessed 25 June 2005 at http://www.stadtentwicklung.berlin.de

Sustrans (1994), Making Ways for the Bicycle. Available online at http://www.sustrans.org.uk

Sustrans (1997), National Cycle Network - Guidelines and Practical Details Issue 2. Available online at http://www.sustrans.org.uk

Sustrans (1999) FF27 Ways through the countryside. Produced in conjunction with the ramblers & BHS. Available online at http://www.sustrans.org.uk

Sustrans (2000), Information Sheet FF04 - Shared Use Routes. Available online at http://www.sustrans.org.uk

Riddall and Trevelyan (2001), Rights of Way – a guide to law and practice, Third Edition, Open Spaces Society and Ramblers' Association.

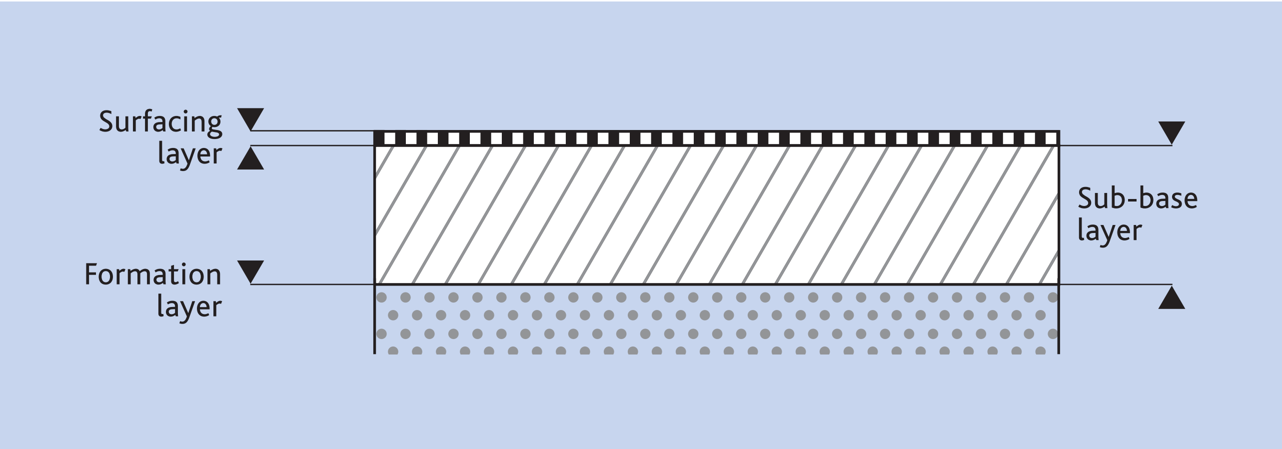
TRL (2002), Design guide for road surface dressing, Road Note 39.

WRAP (2004), The Quality Protocol - for the production of aggregates from inert waste. Available online at http://www.aggregain.org.uk

# Appendix A
# Indicative Surfacing Details

These indicative details appear in this Appendix in the same order in which they are referred to within the Guide.
The layers shown in Figure 1 are referred to throughout this Appendix. These are discussed in Section 10.2 for the Guide.

Figure 1:
Schematic diagram of construction layers in a shared use route

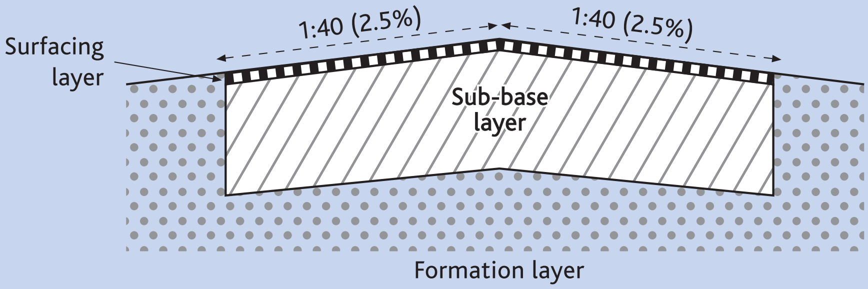


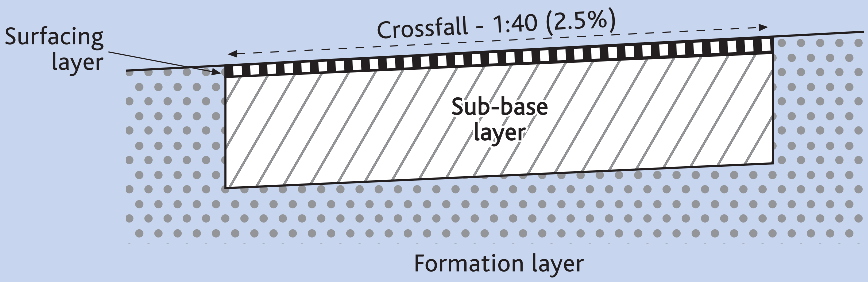

This Appendix contains material specifications, general construction details, indicative material costs and indicative maintenance requirements for the following aspects of shared use routes:

A1. Crossfall and camber
A2. Pothole repair
A3. Grassed gravel surfacing
A4. Open ditch drainage
A5. Filter drainage
A6. Culvert drainage
A7. Soil reversal
A8. Wood-chip surfacing
A9. Unbound aggregate surfacing - 1
A10. Unbound aggregate surfacing - 2
A11. Stone pitching surfacing
A12. Floating path construction
A13. Sealed bituminous surface - 1
A14. Sealed bituminous surface - 2

The information in the following surfacing details is indicative only and not intended to be relied upon in specific cases. Pricing information is also only indicative and current at time of publication and should not be used for detailed pricing estimates. The Countryside Agency and Scott Wilson Pavement Engineering Limited accept no liability for any inaccuracies nor for any loss, expense or damage arising from the use or application of such information.

# A1 Crossfall and Camber




## Indicative construction/ maintenance details

- Cambers are ideally used on flat, poorly drained areas, where the surface of the route is raised and angled to allow water to be run off to adjacent 'off route' drainage.
- Crossfalls are commonly used where the natural drainage does not suit a camber, or on bends where the radius of curvature is small.
- Crossfalls are easier to construct than cambers. The crossfall sheds water in the direction of natural drainage.
- Cambers are preferred to crossfalls by cyclists, pushchair and wheelchair users. The maximum recommended crossfall or camber for non-motorised wheelchair users is 1:50 (2%), but on narrow routes, higher crossfalls and cambers will be needed to shed water effectively.
- Preferably, use a minimum camber of 1:40 (2.5%) on a 2 m wide route, providing a drop of 25 mm. This increases to minimum of 1:20 (5%) for a 3 m wide route, giving a drop of 75 mm.
- Minimum crossfall should be 1:40 (2.5%), with 1:20 (5%) preferable.
- Construction or maintenance of cambers and crossfalls is less than £5 per linear metre for a 2.5 m wide route.

## References


- County Surveyors Society Countryside Working Group, Report on the Surfacing of Bridleways, 2005.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.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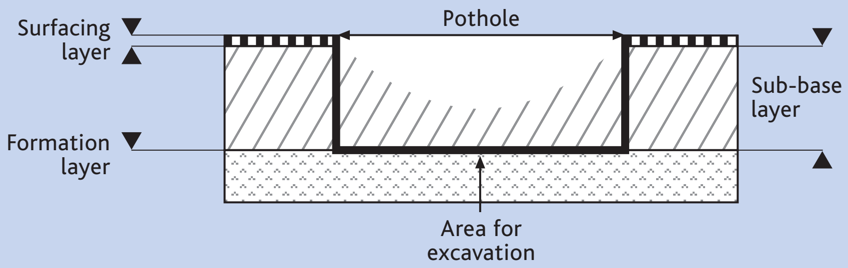
# A2 Pothole Repair




## Material specification

- Backfill material – sub-base grade material, typically 63 mm down.
- Surfacing layer – in keeping with the existing surfacing.

## General construction details

- Undertake full depth repairs only.
- Work should only be undertaken in dry weather, and any excavated area should be dry before backfilling.
- Excavate the pothole to the full depth of sub-base layer. The sides of the excavation section should be straight.
- Fill with backfill material and compact in place.
- Reapply surfacing.

## Indicative material costs

- Costs will vary depending upon the size of the pothole and the surfacing material.
- Backfill material is between £10 and £13 per tonne.
- 20 mm thickness quarry fines (5 mm to dust) can be used to replace an unbound surface or as a temporary reinstatement of a sealed surface. Quarry wastes cost between £7 and £10 per tonne.

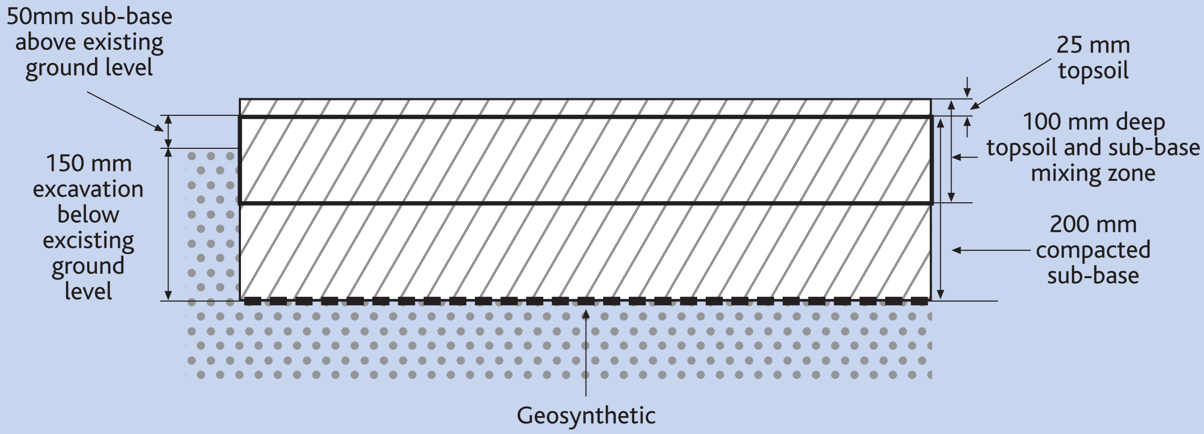
## Indicative maintenance requirements

- Inspect regularly (for example, monthly).
- Repair as required, ideally on an annual basis.
- Ensure repairs are completed before the winter to prevent further deterioration of the pothole and the route.

## References

- County Surveyors Society Countryside Working Group, Report on the Surfacing of Bridleways, 2005.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

# A3 Grassed Gravel Surfacing




## Material specification

- Geosynthetic for strengthening or separation, if required.
- Sub-base aggregate - for example, 63 mm down.
- Topsoil - conforming to BS 3882: 1994.
- Grass seed - approved by an ecologist and preferably trampling resistant.

## General construction details

- Excavate to a minimum 150 mm below existing ground level.
- Place and secure the geosynthetic, if used.
- Place and compact the sub-base aggregate to a minimum thickness of 200 mm. Ensure that the compacted sub-base is at least 50 mm above the existing ground level.
- Provide a crossfall or camber (see Appendix A1).
- Place 25 mm thickness of topsoil over the sub-base. Mix into the prepared sub-base to a depth of 100 mm, using a harrow or rotovator, or a machine excavator bucket.
- Seed the surface and gently roll.

## Indicative material costs

- Sub-base aggregate costs between £10 and £13 per tonne.
- If possible, the topsoil should be reused from excavated arisings. Imported topsoil costs approximately £10 per cubic metre.
- Grass seed mixtures cost between £70 and £85 for a 25 kg bag.

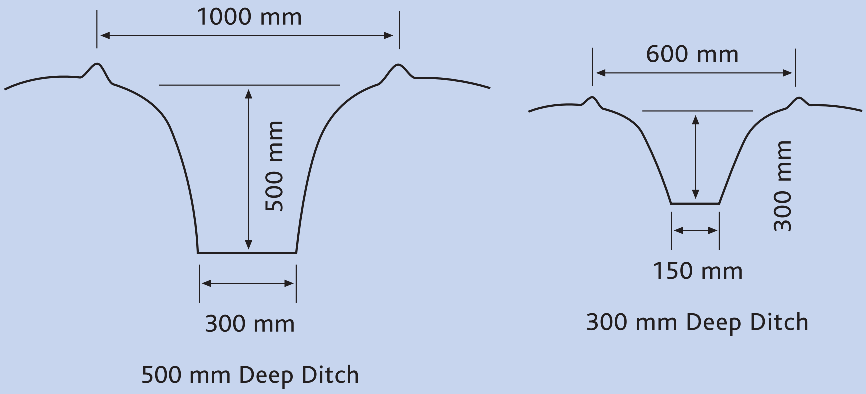
## Indicative maintenance requirements

- Ideally, the grassed surface should be allowed to develop before the route is re-opened for shared use. Maintenance includes reseeding if necessary, preferably carried out in spring.
- Temporary restriction on use may be required for a short period, for example, after prolonged adverse weather, to allow the grass to re-establish.

## References


- British Horse Society, Guide to the Surfacing of Bridleways and Horse Tracks, 2nd Edition, 1995.
- British Standards Institution, BS 3882: Specification for topsoil, 1994.
- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

# A4 Open Ditch Drainage




## General construction details

- Using a suitable excavator, excavate the open ditch within the space available adjacent to route.
- Leave a minimum of 0.3 m, preferably 0.5 m, wide verges between ditch and route.
- Leave wider verges if there is more space available or if the verge is a dual surfacing for a segregated route.
- Excavate the ditch to provide the necessary capacity. Ditches should be used on routes with a minimum gradient between 1:15 (6.5%) and 1:50 (2%).
- Drainage ditches are typically between 0.3 m and 0.5 m deep, with the width of the opening twice the width of the base, as shown.
- Swales may be 0.3 m to 0.5 m deep, and 1.5 m to 2 m wide.
- For drainage ditches and swales, the ditch bed should be smooth.

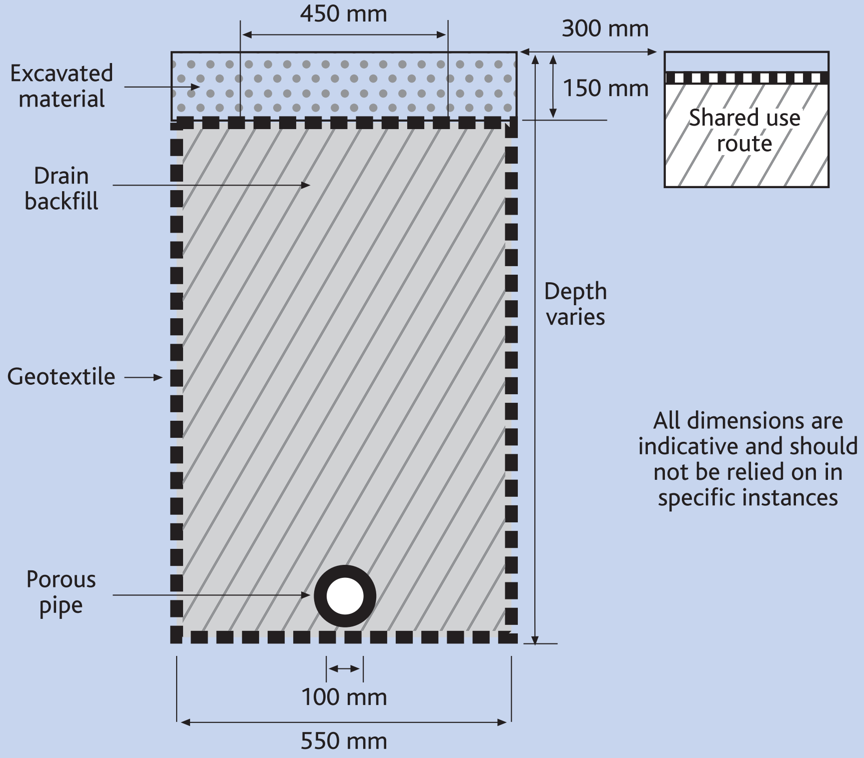
## Indicative maintenance requirements

- Clear open ditches of vegetation, litter and silt at least twice a year, preferably during the autumn and the spring.
- Clearance costs between £0.50 and £1.00 per linear metre, depending on ditch dimensions and conditions.

## References


- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A5 Filter Drainage

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# A5 Filter Drainage continued

## Material specification

- Perforated PVC pipe – the internal diameter of the pipe should be selected to ensure sufficient drainage capacity is provided.
- Drainage backfill – clean aggregate between 20 and 40 mm size.
- Appropriate filter geotextile – the asparity of the geotextile is dependent on the grading of the surrounding natural ground material.

## General construction details

- Excavate the drainage trench to the required dimensions. The ditch width should be 450 mm more than the internal diameter of the pipe.
- Where possible, the trench should be a minimum of 300 mm from the edge of the route. Filter drainage should be used on routes with a minimum gradient between 1:15 (6.5%) and 1:50 (2%).
- Line the trench base and sides with filter geotextile, leaving a minimum of 450 mm overlap at the top of the trench,
- Lay the pipe and backfill to within 150 mm of surface.
- Overlap the geotextile and backfill remaining 150 mm depth with additional drainage backfill or excavated arisings.
- Catch pits should be included at bends, junctions and at 30 m intervals.

## Indicative material costs

- A 100 mm internal diameter pipe costs approximately £6 for a 6 m pipe length.
- A 150 mm internal diameter pipe costs approximately £12 for a 6 m pipe length.
- Drainage backfill material costs between £8 and £17 per tonne, depending on grading and location.
- Geotextiles cost between £1 and £2.50 per square metre.

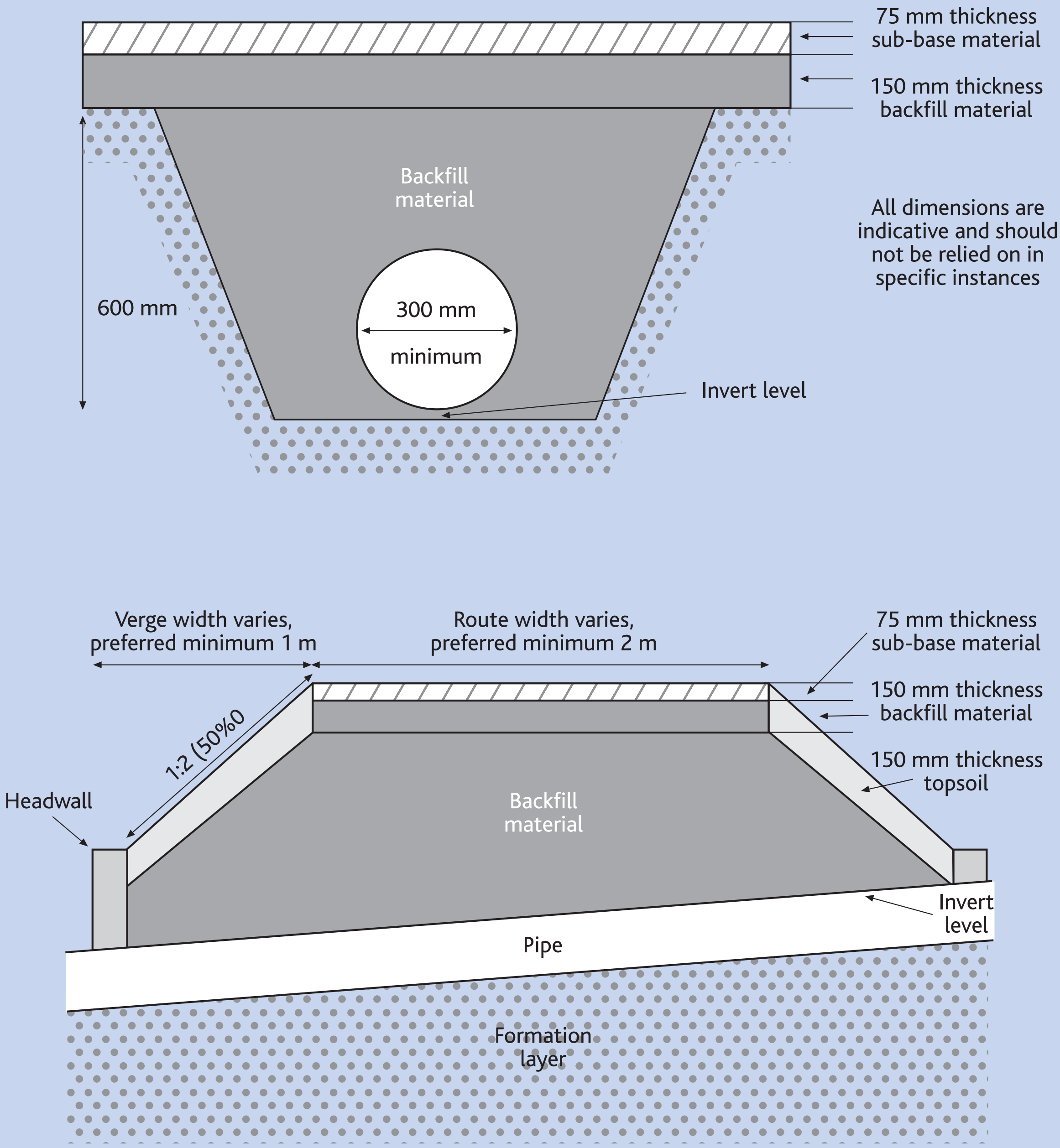
## Indicative maintenance requirements

- Every 6 months, pipes should be rodded, and silt and vegetation removed from catchpits. This is usually conducted every autumn and spring.
- Rodding and catchpit clearance costs between £5 and £10 per catchpit.

## References


- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A6 Culvert Drainage

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# A6 Culvert Drainage continued

## Material specification

- Pipe – Single or double wall plastic pipe or concrete pipe if the depth of cover to the pipe is limited.
- Pipe diameter – Select the pipe diameter to suit the required drainage capacity:
- Greater than or equal to 2/3 of the capacity required for the return period storm event.
- A minimum of 300 mm diameter for a stream/water course.
- Pipe length – The length of the pipe should be, at minimum, the width of the route plus 2 m.
- Backfill material – 63 mm down aggregate.
- Headwalls – Masonry or concrete.

## General construction details

- Establish the 'wetted' drainage catchment area for the culvert, such as:
- The spacing interval to determine the pipe capacity and size.
- The low points in existing open drainage systems.
- Excavate drainage trench and prepare pipe bedding to required gradient or to suit existing headwalls. A minimum gradient between 1:15 (6.5%) and 1:50 (2%) is preferred. The pipe bedding can be a levelling layer of backfill material.
- The invert level (the lowest point of the internal wall of the pipe) should be at a depth equal to the pipe diameter plus an additional 50% to 100% of pipe diameter. For example, a 300 mm internal diameter pipe should be at least 450 mm below the surface at its highest point in the ground.
- Place pipe on prepared pipe bedding. Backfill and compact, then construct overlying route.
- Construct culvert headwalls to retain the backfill and pipe bedding.
- Ideally culverts should be located in areas of low water velocity. When water velocities are higher, provide protection at headwalls to prevent scouring.

## Indicative material costs

- A 150 mm diameter PVC pipe costs between £12 and £16 for a 6 m length.
- A 300 mm diameter PVC pipe costs between £11 and £28 for a 6 m length.
- Backfill materials, 63 mm down, cost approximately £10 to £13 per tonne.

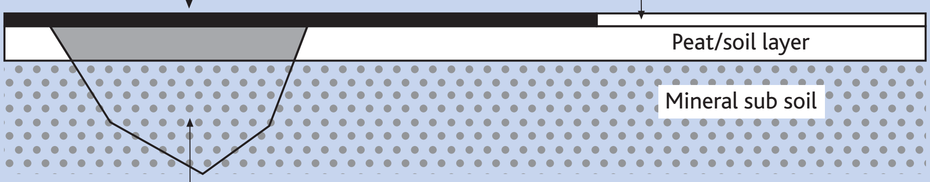
## Indicative maintenance requirements

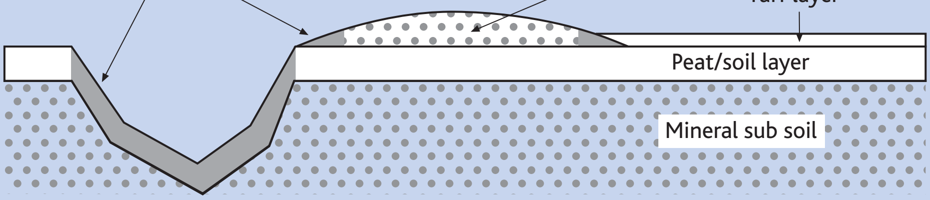
- Every 6 months, culverts should be rodded, and silt and vegetation removed. This is usually conducted every autumn and spring.
- Clearance costs between £15 and £50 per culvert, depending on their size and number.

## References


- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A7 Soil Reversal




## Indicative plant & material specification

- Excavator – a 360 degree tracked excavator with bogmaster tracks. Machine size varies with each location but typically a 12 to 15 tonne machine is used.
- Suitable natural ground for route construction, such as peat.
- Seed – approved by an ecologist.
- Drainage materials if required, such as culvert pipes.

## Indicative construction details

- Remove overlying turfs carefully and store on the site for reuse in the construction.
- Excavate the ditch to sufficient depth to reach the natural ground and obtain sufficient material for route construction. Excavate materials from the upside of the route, or on both sides.
- Install any additional drainage required, such as culverts under the route.
- Excavate the natural ground and deposit this on the vegetation layer along the route, to approximately 600 mm thickness.
- Place any excavated aggregate so that the coarser material is near the base of the route construction and the finer material at the top.
- Compact the placed material with the excavator bucket and form a camber or crossfall on the route surface (see Appendix A1).
- Replace any excavated material unsuitable for route construction within the adjacent ditch.
- Ensure the ditch has a smooth base with a slight fall (gradient) to prevent standing water or stagnation.
- Replace turfs over the surface of the ditch and the shoulders of route.

## Indicative construction costs

- Costs range between £6 and £25 per linear metre depending on the ease of access and length of the route.
- The surface may include imported aggregate at additional cost.

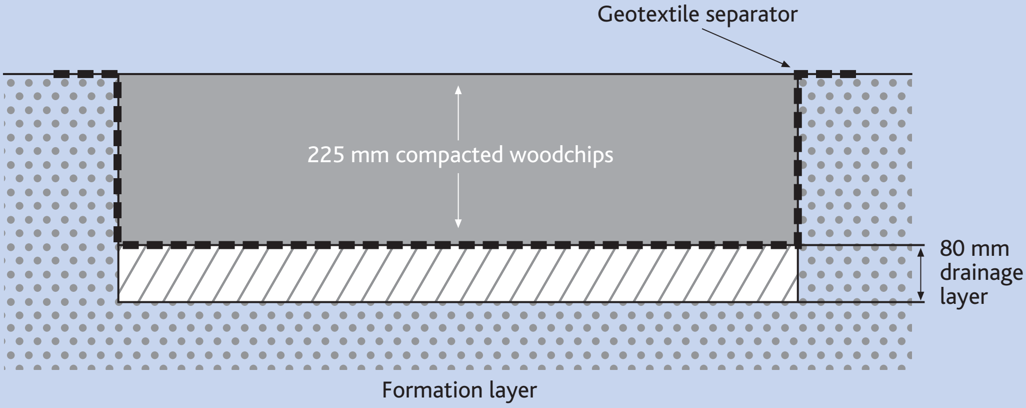
## Indicative maintenance requirements

- Regular checks on the surface condition. Reseed when necessary.
- Clear excessive vegetation from the ditches and clear culverts.

## References

- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.

# A8 Woodchip Surfacing




## Indicative material specification

- Drainage layer aggregate – A free draining coarse granular material, for example 80 mm down.
- Geotextile - Non woven or woven separator geotextile.
- Woodchips – ideally 25 to 75 mm x 25 mm x 5 mm. Other chipped or compostable material may be substituted.
- The formation layer should be a free draining natural ground. This surfacing is not appropriate for clays or poorly drained natural ground, nor should they be used in exposed windy locations (where they will rapidly blow away).

## Indicative construction details

- Excavate to a depth of approximately 300 mm below the existing ground level.
- Place a 80 mm of aggregate to provide a drainage layer.
- Place and secure the geotextile.
- Place 300 mm thickness of woodchips and compact to 225 mm.

## Indicative material costs

- Drainage material is £10 to £13 per tonne.
- Geotextile separator costs between £1 and £2.50 per square metre.
- Woodchips may be available free as a by-product from local vegetation management. Bark mulches cost between £12 and £35 per cubic metre.

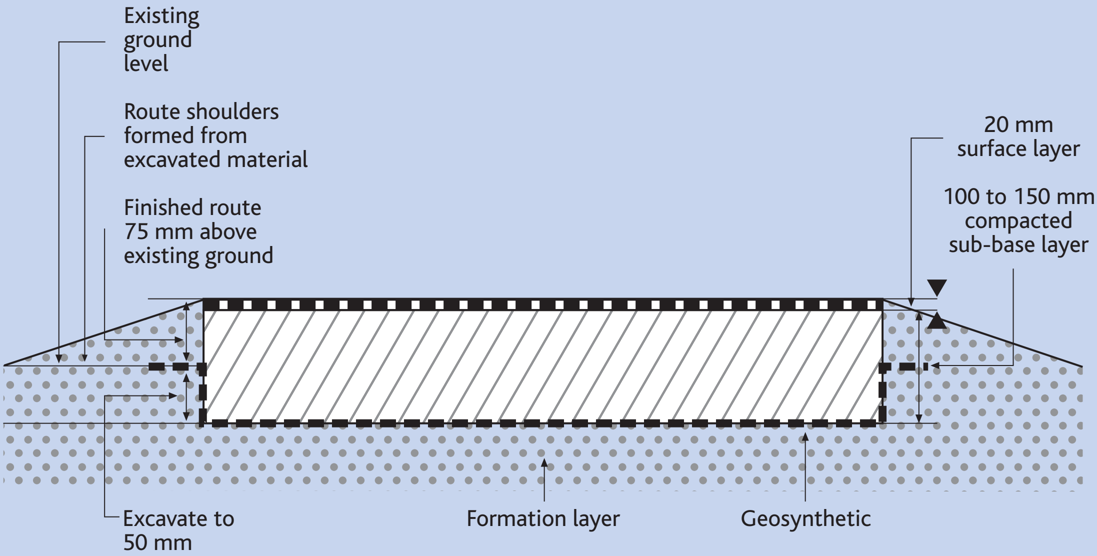
## Indicative maintenance requirements

- Inspect regularly, such as monthly or bi-monthly, and replace woodchips as required.
- Allow for annual replacement of woodchips as a minimum requirement, although more frequent replacement may be required, depending on the rate of decomposition.
- Ideally, conduct woodchip replacement in conjunction with local vegetation management works.

## References


- British Horse Society, Guide to the Surfacing of Bridleways and Horse Tracks, 2nd Edition, 1995.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

# A9 Unbound Aggregate Surfacing – 1




## Indicative material specification

- Surface layer – 3 mm nominal size limestone dust.
- Sub-base layer – 63 mm down aggregate or road planings.
- Geosynthetic – a geotextile or combined geotextile/geogrid on soft natural ground.

## Indicative construction details

- Excavate to approximately 50 mm below the existing ground level. Remove any large stones and secure the geotextile.
- Place and compact the sub-base aggregate to a thickness between 100 and 150 mm.
- Provide adequate crossfall or camber to the sub-base layer so that the route sheds water (see Appendix A1).
- Place and compact surface layer, retaining the camber or crossfall.
- Ensure the surface of the route is 75 mm above the adjacent ground level, for run off drainage.
- Use excavated material to give protective shoulders to the route.

## Indicative costs

- Limestone dust, or similar surfacings, costs £7 to £10 per tonne.
- The sub-base layer material costs £10 to £13 per tonne.
- A geotextile costs between £1 and £2.50 per square metre.

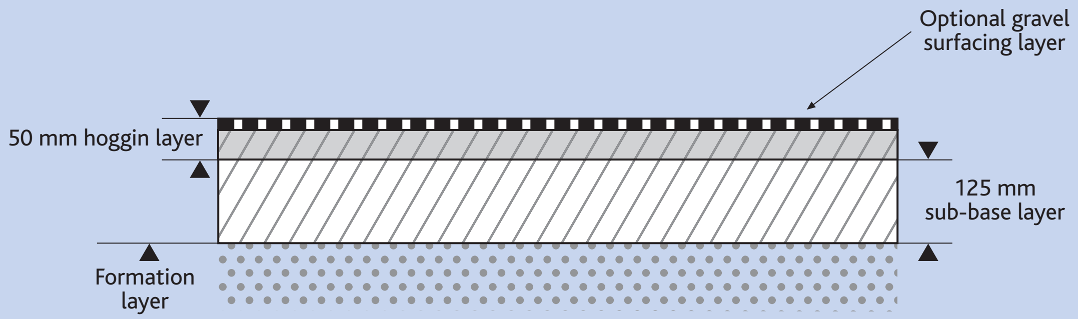
## Indicative maintenance requirements

- Conduct fortnightly inspection of route surface, with litter/leaf removal as required. Removal of detritus costs £0.10 to £0.20 per square metre.
- The limestone dust surface layer erodes at about 3 mm per annum. Re-grading and re-dusting will be required every 5 to 10 years, at a cost of approximately £2.50 per square metre.

## References


- British Horse Society, Guide to the Surfacing of Bridleways and Horse Tracks, 2nd Edition, 1995.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A10 Unbound Aggregate Surfacing – 2




## Indicative material specification

- Hoggin – Clay and fines content should be the minimum sufficient to bind the material.
- Sub-base aggregate – 63 mm down.
- Optional surfacing layer – 10 to 5 mm rounded gravel.
- If required, a geotextile separator can be placed over the formation layer.

## Indicative construction details

- Excavate to approximately 175 mm, secure any geotextile required.
- Place and compact the sub-base and then the hoggin. Provide an appropriate camber or crossfall to the hoggin layer.
- Place the surfacing gravel, if used.

## Indicative costs (supply, place and compact)

- Hoggin may be won locally or imported to the site, at a cost of less than £2 per square metre for a 50 mm thick layer.
- The sub-base layer material costs between £10 and £13 per tonne.
- A geotextile separator, if used, costs £1 to £2.50 per square metre.

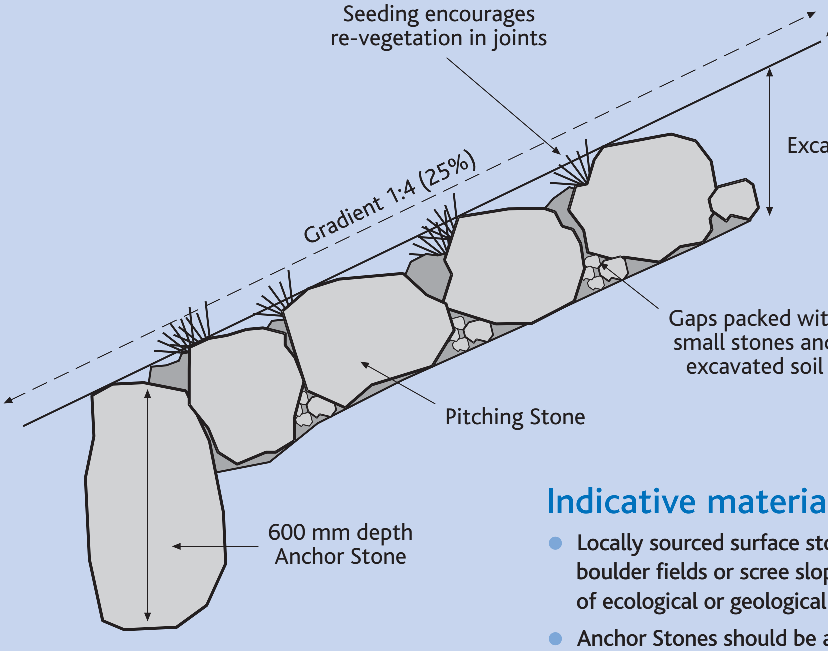
## Indicative maintenance requirements

- Inspect regularly, such as monthly or bimonthly, and rake surfacing as required. Remove litter and detritus from the surface, at a cost of £0.10 to £0.20 per square metre.
- Re-grade and re-dress surface as necessary, typically once every 5 or 10 years, at a cost of approximately £2.50 per square metre.

## References


- British Horse Society, Guide to the Surfacing of Bridleways and Horse Tracks, 2nd Edition, 1995.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A11 Stone Pitch Surfacing




## Indicative material specification

- Locally sourced surface stone – stone can be obtained from boulder fields or scree slopes only if these features are not of ecological or geological importance.
- Anchor Stones should be at least 600 mm deep and Pitching Stones 300 mm.

## Indicative construction details

- Excavate to the required depth. The finished surfacing should be at or below the depth of the surrounding ground or vegetation. The excavated depth should accommodate the stones but finish the path at or below this level.
- Do not excavate more than can be completed in one day. Two people can complete a 10 m long section of a 1 m wide route in one day.
- Start on the downhill end of a section and work up the hill.
- Dig in the Anchor Stone so that it is flush with the lower surface. The Anchor Stone should be dug in as deep as possible.
- Dig in the Pitching Stones, leaving the flattest surface upwards and at no more than 5 degrees from the horizontal. The rise between stones should be not more than 200 mm.
- Butt adjoining stones against each other, wedging them in place using smaller stones in the gaps. Use larger stones at the path edges to prevent lateral movement.
- Compact excavated soil into gaps and crevices. Fertilise and reseed when appropriate.

## Indicative material costs

- Pitching stones are usually available in the vicinity where these surfacings are required. Imported stones are likely to cost in excess of £40 per square metre.
- Transportation of stone and machinery to site by helicopter to remote areas costs £550 to £600 per hour. Depending on the length of the flight, a helicopter can usually transport 20 to 25 tonnes per hour, lifting a maximum weight of 1 tonne per trip.

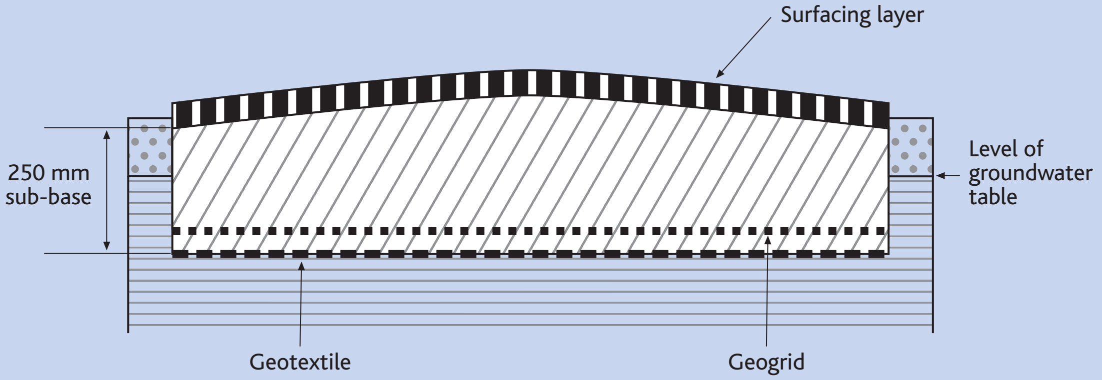
## Indicative maintenance requirements

- Regular inspection.
- Fertilising and reseeding of vegetation as necessary.
- Reinstatement of any loose stones when required.

## References

- Countryside Agency, Pennine Bridleway National Trail Specification, 1999.
- Davies, P., Loxham, J. and Huggon, G., Repairing Upland Path Erosion – A Best Practice Guide, Lake District National Park Authority, National Trust and English Nature, 1996.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

# A12 Floating Path Construction




## Indicative material specification

- Geosynthetics – use either:
  – A separator geotextile and a separate strengthening geogrid.
  – A combined geotextile/geogrid.
  – A woven strengthening geotextile.
- Alternatively brushwood or brushwood bundles may be used.
- Sub-base material – 75 mm down aggregate.
- Surfacing layer – 6 mm to dust aggregate.

## Indicative construction details

- Excavate to a suitable formation layer using an excavator with bogmaster tracks. Retain the excavated materials for verges.
- Place and secure geotextile separator and geogrid to the formation layer.
- When the groundwater is very close to the surface, it is appropriate to place the geotextile and geogrid directly onto the surface and build the route on top of the existing ground level.
- Place the sub-base layer to a minimum thickness of 250 mm. The sub-base layer should not be compacted.
- If the natural ground is very weak, additional geogrid layers may be required within the sub-base layer.
- Provide a camber or crossfall to the sub-base layer (see Appendix A1).
- Place a minimum 20 mm thickness of surfacing material over the sub-base layer.

## Indicative material costs

- The geotextile separator is between £1 and £2.50 per square metre.
- Sub-base material costs between £10 and £13 per tonne.
- Surfacing material costs between £7 and £10 per tonne.

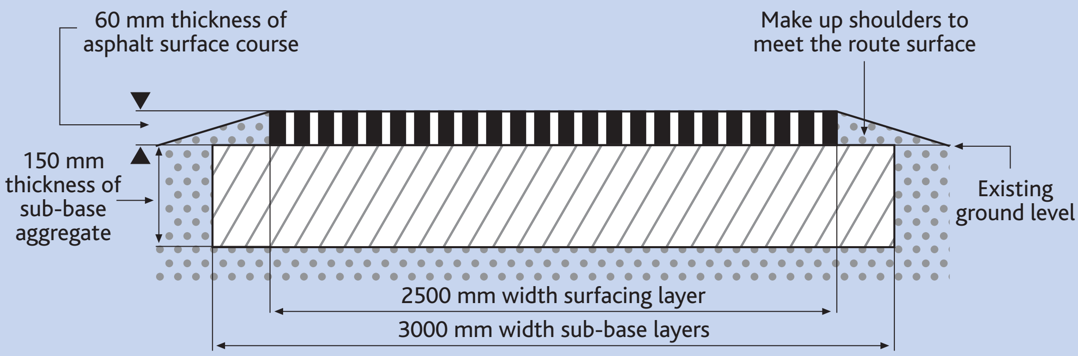
## Indicative maintenance requirements

- Regular inspection.
- Redressing of surfacing material can be expected every 5 to 10 years, at a cost of approximately £2.50 per square metre.

## References


- Davies, P., Loxham, J. and Huggon, G., Repairing Upland Path Erosion – A Best Practice Guide, Lake District National Park Authority, National Trust and English Nature, 1996 .
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.

# A13 Sealed Bituminous Surface – 1 Asphalt Surface




## Indicative material specification

- Sub-base layer – 63 mm down aggregate.
- Surfacing layer – 60 mm thickness of asphalt. Select either:
- 20 mm thickness of dense bituminous macadam containing 6 mm aggregate, over 40 mm thickness of dense bituminous macadam containing 20 mm aggregate.
- 60 mm thickness of dense bituminous macadam containing 14 to 20 mm graded aggregate.

## Indicative construction details

- Routes predominantly for cycling should be machine laid to provide adequate ride quality.
- Excavate to 150 mm below the existing ground level and proof roll the formation layer.
- Treat the formation layer with weed killer and, on weak natural ground, secure a geotextile/geogrid.
- Place and compact the sub-base layer using a vibro plate or roller, to achieve the required thickness.
- Lay the asphalt surface layer, with the required camber or crossfall (see Appendix A1).
- The finished surface should be raised above the existing ground level, with soft edges/verges reinstated from the excavated material.

## Indicative material costs

- Sub-base material costs between £10 and £13 per tonne.
- Asphalt surfacing costs between £2 and £5 per square metre.

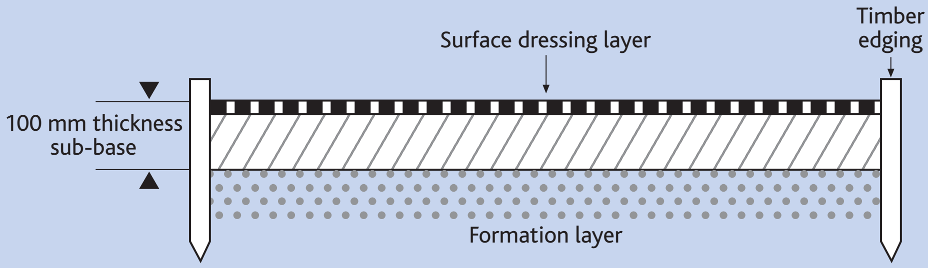
## Indicative maintenance requirements

- Remove litter and detritus from the surface, at a cost of £0.10 to £0.20 per square metre.

## References


- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Sustrans, Making Ways for the Bicycle, 1994.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.

# A14 Sealed Bituminous Surface – 1 Surface Dressing




## Material specification

- Sub-base - 63 mm down aggregate.
- Surface dressing aggregate - 6 mm to 10 mm chippings.
- Surface dressing binder - Bitumen emulsion, which may be reinforced with glass fibres.
- Edging (if required) - Tanalised timber, otherwise excavate formation for structural layer for re use on route surface edgings.

## General construction details

- Insert timber edging into the natural ground at a level that provides suitable crossfall across the route. Alternatively, excavate the ground to the required depth. Retain any material arising from excavation.
- Place and compact the sub-base material to the appropriate thickness, and provide crossfall/camber (see Appendix A1).
- Single surface dressing: Spray bitumen emulsion onto the sub-base at a rate of 2 litres per square metre. Spread the chippings over the bitumen and roll the chippings into the bitumen before it hardens. Brush off and reuse any loose chippings.

## Indicative material costs

- The sub-base layer material costs between £10 and £13 per tonne.
- Single surface dressing costs approximately £0.50 per square metre.

## Indicative maintenance requirements

- Regularly clear litter and leaf debris, at a cost of £0.10 to £0.20 per square metre.
- The surface will need to be re-dressed every 5 to 10 years, depending on wear, at a cost of approximately £0.50 per square metre.

## References


- County Surveyors Society Countryside Working Group, Report on the Surfacing of Bridleways, 2005.
- Davis Langdon and Everest, Spon's Civil Engineering and Highway Works Price Book 2004.
- Scottish National Heritage, Scottish Enterprise and The Paths for All Partnership, Lowland Path Construction – A Guide to Good Practice, 2001.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# Appendix B
# Useful Contacts and Sources of Further Information

### British Waterways
Willow Grange, Church Road, Watford, Herts WD17 4QA
Tel: 01923 201120 Fax: 01923 201400
Email: enquiries.hq@britishwaterways.co.uk
www.british-waterways.co.uk

### British Horse Society
Stoneleigh Deer Park, Kenilworth, Warwickshire, CV8 2XZ
Tel: 08701 202244 Fax: 01926 707800
Email: enquiries@bhs.org.uk
www.bhs.org.uk

### British Trust for Conservation Volunteers
Conservation Centre, 163 Balby Road, Doncaster,
South Yorkshire DN4 0RH
Tel: 01302 572 244 Fax: 01302 310 167
Email: Information@btcv.org.uk
www.btcv.org

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

### Council for British Archaeology
St Mary's House, 66 Bootham, York YO30 7BZ
Tel: 01904 671417 Fax: 01904 671384
www.britarch.ac.uk

### Country, Land and Business Association
16 Belgrave Square, London SW1X 8PQ
Tel: 020 7235 0511 Fax: 020 7235 4696
Email: mail@cla.org.uk
www.cla.org.uk

### Countryside Agency
John Dower House, Crescent Place, Cheltenham,
Gloucestershire GL50 3RA
Tel: 01242 533222 Fax: 01242 584270
Email: info@countryside.gov.uk
www.countryside.gov.uk

### Countryside Recreation Network
Sheffield Hallam University, Unit 7, Sheffield Science Park,
Howard Street, Sheffield S1 2LX
Tel: 0114 225 4494 Fax: 0114 225 4038
Email: CRN@shu.ac.uk
www.countrysiderecreation.org.uk

### CTC (the National Cyclists' Organisation)
69 Meadrow, Godalming, Surrey GU7 3HS
Tel: 0870 873 0060 Fax: 0870 873 0064
Email: cycling@ctc.org.uk
www.ctc.org.uk

### Department of Environment, Food and Rural Affairs (Defra) Sponsorship, Landscape & Recreation Division
Zone 1/02, Temple Quay House, 2 The Square,
Temple Quay, Bristol BS1 6EB
Tel: 0117 372 8204 Fax: 0117 372 8587
E-mail: rights.ofway@defra.gsi.gov.uk
www.defra.gov.uk/wildlife-countryside/issues/public/index.htm

### Department of Transport (DfT)
Great Minster House, 76 Marsham Street, London SW1P 4DR
Tel: 020 7944 8300 Fax: 020 7944 9622
www.dft.gov.uk

### Disabled Ramblers
14 Belmont Park Road, Maidenhead, Berkshire SL6 6HT
Tel: 01628 621414
www.disabledramblers.co.uk

### Disability Rights Commission
FREEPOST MID02164, Stratford upon Avon CV37 9BR
Tel: 08457 622 633
Textphone: 08457 622 644 Fax: 08457 778 878
www.drc.gov.uk

### English Heritage
PO Box 569, Swindon, Wiltshire SN2 2YP
Tel: 0870 333 1181 Fax: 01793 414926
www.english-heritage.org.uk

### English Nature
Northminster House, Peterborough PE1 1UA
Tel: 01733 455101 Fax: 01733 455103
Email: enquiries@english-nature.org.uk
www.english-nature.gov.uk

### Environment Agency
National Customer Contact Centre
PO Box 544, Rotherham, South Yorks S60 1BY
Tel: 08708 506506
www.environment-agency.gov.uk

### Fieldfare Trust
7 Volunteer House, 69 Crossgate, Cupar, Fife KY15 5AS
Tel: 01334 657708 Fax: 0870 7066008
Email: info@fieldfare.org.uk
www.fieldfare.org.uk

### Forestry Commission England
Great Eastern House, Tennison Road, Cambridge CB1 2DU
Tel: 01223 314546 Fax: 01223 460699
Email: nationaloffice.fce@forestry.gsi.gov.uk
www.forestry.gov.uk/england

**Health and Safety Executive (Construction Division)**
Rose Court, 2 Southwark Bridge, London SE1 9HS
Tel: 020 7556 2100 Fax: 020 7556 2109
www.hse.gov.uk/construction

**Institute of Public Rights of Way Officers**
PO Box 78, Skipton, North Yorkshire BD23 4UP
Tel: 07000 782318 Fax: 07000 782319
Email: iprow@iprow.co.uk
www.iprow.co.uk

**International Mountain Bike Association (UK)**
Woodview, Coddington, Ledbury HR8 1JH
Email: imba@branchline.demon.co.uk
www.imba-uk.com

**Local Government Association**
Local Government House, Smith Square, London SW1P 3HZ
Tel: 020 7664 3131 Fax: 020 7664 3030
Email: info@lga.gov.uk
www.lga.gov.uk

**Moorland Association**
16 Castle Park, Lancaster LA1 1YG.
Tel: 01524 846846 Fax: 01524 382247
Email: website@moorlandassociation.org
www.moorlandassociation.org

**Moors for the Future,**
The Information Centre, Buxton Road, Castleton, S33 8WP
Tel/Fax: 01433 621656
E-mail: moors@peakdistrict.gov.uk
www.moorsforthefuture.org.uk

**National Association for Areas of Outstanding Natural Beauty**
The Old Police Station, Cotswold Heritage Centre, Northleach, Gloucestershire GL54 3JH
Tel: 01451 862007 Fax: 01451 862001
www.aonb.org.uk

**National Farmers' Union**
Agriculture House, 164 Shaftesbury Avenue, London WC2H 8HL
Tel: 020 7331 7200 Fax: 020 7331 7313
email: nfu@nfuonline.com
www.nfuonline.com

**National Trust**
Heelis, Kemble Drive, Swindon, Wiltshire SN2 2NA
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Email: enquiries@thenationaltrust.org.uk
www.nationaltrust.org.uk

**Royal Society of Wildlife Trusts**
The Kiln, Waterside, Mather Road, Newark, Nottinghamshire NG24 1WT
Tel: 0870 036 7711 Fax: 0870 036 0101
Email: enquiry@wildlife-trusts.cix.co.uk
www.wildlifetrusts.org

**Ramblers' Association**
2nd Floor Camelford House, 87-90 Albert Embankment, London SE1 7TW
Tel: 020 7339 8500 Fax: 020 7339 8501
Email: ramblers@london.ramblers.org.uk
www.ramblers.org.uk

**Sensory Trust**
Watering Lane Nursery, Pentewan, St. Austell, Cornwall PL26 6BE
Email: enquiries@sensorytrust.org.uk
www.sensorytrust.org.uk

**Sport England**
3rd Floor Victoria House, Bloomsbury Square, London WC1B 4SE
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Email: info@sportengland.org
www.sportengland.org

**Sustrans**
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Tel: 0117 926 8893 Fax: 0117 929 4173
Email: Info@sustrans.org.uk
www.sustrans.org.uk

**Waste and Resources Action Programme (WRAP)**
The Old Academy, 21 Horse Fair, Banbury, OX16 0AH
Tel: 0808 100 2040
www.wrap.org.uk

**Waterway Recovery Group**
PO Box 114, Rickmansworth, WD3 1ZY
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Email: enquiries@wrg.org.uk.
www.wrg.org.uk

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Landscape
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Recreation

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