Annex A

The Brief
AN ASSESSMENT OF THE IMPACT ON ARCHAEOLOGY OF THE PROPOSED HADRIAN'S WALL NATIONAL TRAIL: COUNTRYSIDE COMMISSION/ENGLISH HERITAGE RESEARCH BRIEF

1. Background

The Countryside Commission proposes to create a national trail following the course of Hadrian's Wall from end to end, starting at Wallsend in the east, and finishing at Bowness on Solway in the west. The proposed national trail will be approximately 80 miles long and will provide access to the outstanding visible Roman remains along the route, whilst passing through a rich variety of contrasting landscapes. These will include the spectacular scenery through Northumberland National Park and Solway Coast Area of Outstanding Natural Beauty, other areas of attractive countryside in Cumbria and Northumberland, and the riverside through the cities of Newcastle and Carlisle.

The need for a continuous and safe path providing access to Hadrian's Wall and linking the important Roman sites was first identified by the Hadrian’s Wall Consultative Committee. This body is comprised of 32 public and private organisations with an interest in the wall or its landscape setting. The main purpose of the committee is to guide the work of its member organisations and provide a single policy framework for the whole wall. Major recommendations were published by the Committee in 1984 in a "Strategy for Hadrian's Wall" which included the proposal for a long distance footpath along the line of Hadrian’s Wall.

In 1985 the Commission sponsored the short term appointment of a Hadrian’s Wall Project Officer to identify a continuous, safe and convenient route for a long distance path. His report in 1986 showed that a route was feasible but would involve a considerable amount of road walking.

In 1989 the Commission completed a review of its recreation policies published in "Paths, Routes & Trails" including redefining criteria for according new routes with national trail status. The Hadrian’s Wall route was seen as a national priority for inclusion as a new breed of national trail.

A Project Officer was appointed in 1989 to carry out a detailed investigation, taking into account these new policies, of the most suitable line for the route to follow. A report was prepared for consultation setting out a draft proposal for the route with ideas on its future development. This formed the basis of an informal public consultation document (CCP319) published late in January 1990 and distributed to approximately 250 statutory and non statutory organisations, landowners and representatives.

The procedure adopted by the Commission for public consultation is:

a. informal public consultation to all interested parties; followed by
b. formal consultation to statutory organisations; followed by
c. final report for approval by the Secretary of State.

Once approval has been given, implementation of the work to create the route on the ground is the responsibility of the statutory highway authorities reimbursed with 100% grant aid from the Commission.
In April 1991 a replacement Project Officer took up post with the priority of analysing and considering the responses to the informal consultation document; carrying the project forward through to the formal consultation stage and then to the start of implementing the route on the ground.

The Commission has a statutory duty to plan long distance routes, or national trails as they are now known under the 1949 National Park and Access to the Countryside Act. The Commission's key policy statements on national trails are set out in the following documents:

a. Policies for enjoying the countryside (CCP234) 1984
b. Enjoying the countryside: Priorities for action (CCP235) 1987
c. Paths, Routes and Trails: Policies and priorities (CCP236) 1989

Hadrian's Wall is one of Britain's finest archaeological and historic features and is unique in Western Europe. The extensive and sometimes dramatic remains attract visitors from all over the world. The Hadrian's Wall 'military zone' is approx 73 miles long, and has 12 major forts with numerous other significant remains and forts lying close to it in a corridor several miles wide in places. It was formally designated a World Heritage Site in 1987 by UNESCO (one of only 14 sites in the UK) in recognition of its outstanding Roman archaeology in content, preserved form and landscape setting. It is equally regarded by English Heritage as one of the most important monuments in Britain and is a scheduled ancient monument.

The statutory body responsible for the protection and maintenance of the fabric of the monument is English Heritage who own and hold in guardianship several principal sites. Regular inspection of the Wall is carried out by field monument wardens, and maintenance achieved through grant aid to landowners.

The corridor of land through which the Wall passes is in the ownership of many public and private landowners, the most significant Roman sites lying in the custodianship of English Heritage, The National Trust, Vindolanda Trust and the County Councils.

Development control of the Wall corridor is administered through the planning policies of three County Councils and six district councils. In addition sections of the corridor are recognised and protected through a number of designated landscape types.

The central section lies within Northumberland National Park which has specific landscape policies relating to safeguarding the setting of Hadrian's Wall. The western section lies within the Solway Coast Area of Outstanding Natural Beauty. A broad distribution of smaller sections lie within recognised sites of ecological and geological importance, a number of which are notified SSSI.

The Commission have taken a long standing interest in Hadrian's Wall and have been involved as a major partner in grant aiding a variety of projects in the Wall corridor. These include: National Trust land acquisition at Housesteads; National Trust Information Centre at Housesteads; publication of the Hadrian's Wall major sites leaflet; refurbishment of Once Brewed Youth Hostel.
2. **Introduction to the Research Study**

The concept of the Romans building a frontier wall across Britain 1800 years ago has drawn many thousands of visitors from all parts of the world to visit and explore the Wall each year. The extensive visible Roman remains, the major fort sites and the superb landscape setting has wide appeal to visitors of all ages and interests.

The development of the trail across 80 miles of changing scenery and varied terrain, will provide a challenging but manageable walking experience of considerable archaeological interest, that can comfortably be taken in parts, or walked throughout its length in a week. Significantly the trail will also provide an important spinal route with links through this corridor of attractive countryside that will appeal to a wider type of visitor wishing to explore the surrounding countryside, visit the nearby attractions and return via short circular walks.

The opportunities and benefits of this national trail proposal are exciting and unique. The creation of a high quality walking route through landscape of impressive variety and archaeological interest, manageable in length and across terrain which is generally less strenuous in nature, is likely to attract a much wider type of user than with some other national trails, such as the Pennine Way. Furthermore easy access to all parts of the route, and its link through the cities of Newcastle and Carlisle will give urban users, local users and visitors greater opportunity to explore attractive short sections of the route. The Wall also has enormous value and interest as a cultural, historical and education resource. Exposure to the ancient monument through the national trail route is a valuable opportunity to disseminate the importance of this unique part of Britain’s heritage.

Clearly the benefits and opportunities are many and the trail is likely to attract many visitors to use the route in a variety of ways. It is fundamental to the planning of this proposal that the establishment and management of the trail must be in harmony with the fabric and setting of the monument. It must provide a walking surface that will not impact upon the archaeology, that is pre-emptive in its management against erosion, and is sustainable. The Commission believe that the most attractive and appropriate surface in this fine landscape setting, is the maintenance of a sustainable greensward path. The aim should be a policy of minimum intervention to the path surface wherever possible.

Advice is therefore needed on a prescription of sustainable management treatments that satisfy a range of physical, ecological and landscape constraints and which will safeguard the monument.

To date, little work has been undertaken by other organisations about the impact of visitors on the fabric of the monument. The most significant visible evidence of visitor use upon a contained area of archaeology, lie at the major fort sites, specific milecastles and pressure points along the Wall.

Survey data suggests that the popular fort sites represent the most visited contained area of visitor impact of all the known archaeological sites.
In 1988 English Heritage carried out a study to examine the types and incidence of landscape wear and tear at four historic sites: Tynemouth Priory and Castle, Dunstanburgh Castle, Housesteads and Stonehenge. The first three sites are all in north east England. Housesteads is situated on Hadrian's Wall. The aims of the research were to monitor wear in relation to visitor pressure and initiate prescriptive treatments.

Its conclusions showed that erosion was a function of visitor distribution across the site, numbers and patterns of daily users, the site's physical characteristics and weather conditions. Maintenance of a grass sward across the site was dependent upon the provision and layout of footpaths, signing and other amenities and the surface treatments used.

More recently, in 1989, a detailed Baseline Condition Survey was carried out by the Commission for the whole of the Pennine Way. Part of the Pennine Way includes a 9 km section along Hadrian's Wall through Northumberland National Park.

Within this section, a 4.3 km length between Housesteads and Steel Rigg represents the most popular walked part of the whole Roman Wall.

In September 1991 the Commission undertook a comprehensive Baseline Condition Survey of the whole length of the proposed Hadrian's Wall National Trail. Importantly this also included a study on the alignment of known features of archaeology. The data and findings from this survey will form an important input to the current proposed study.

Comprehensive information about the distribution and pattern of visitors to the wall corridor is not readily available. However a varied number of sources of information relate to the most popular sites along the central section. These include:

- the major fort sites in private and public ownership
- Northumberland National Park visitor surveys
- the "ASH" Pennine Way study 1990 for the Countryside Commission
- car park statistics at various locations
- stile counter at Steel Rigg in Northumberland National Park
- "DART" report 1976
- Hadrian's Wall Strategy 1984

Whilst this information is patchy and has not been collected in a co-ordinated way, it is possible to make some comparison of visitor numbers between the major fort sites and the most popular section of footpath along the Wall. The most visited fort site is Housesteads with an annual attendance of 121,000 (1988). It is also the single most popular attraction in Northumberland with a maximum peak season use of 1554 visits recorded over an 8 hour period (1990). This compares with an estimated 100,000 visitors per annum walking from Steel Rigg to Peel Crag, with a max peak season use of 1567 visits recorded over a similar 8 hour period (1990).

An analysis of visitor numbers to the major fort sites 1973-83, and an assessment of potential peak use and site capacity are set out in the "Hadrian's Wall Strategy document" 1984. Information is also available on the trends and experience of a number of established national trails managed by the Commission, with comparable features of terrain and archaeology. These include: the Ridgeway, Offas Dyke, Wolds Way and Peddars Way. Visitor usage of some of the many other long distance routes not officially
recognised as national trails may also help to provide useful comparisons where statistics and information are available.

Using these models as a guide to the likely trends of future visitor activity, advice is sought on the potential use and distribution of visitors to this national trail.

In order to assist with making informed decisions about the implementation and future management of this new national trail, the Commission is proposing to undertake the following research. This paper sets out a brief for an assessment into the effects on archaeology of the establishment of the proposed national trail.

3. Objectives of the Research Study

The main purpose of undertaking the research study is to:

a. Identify and assess features of the monument's archaeology, that are vulnerable to damage from visitor pressure and rank in order of sensitivity.

b. Provide a model of current and predicted visitor distribution across the length of the route that impact upon the monument.

c. Identify the location of key sensitive archaeological sites within a defined corridor of the proposed route alignment.

d. Determine the optimum alignment of the route to minimise the impact of visitors at these key sensitive sites.

e. Prescribe the most appropriate sustainable treatments for the establishment and management of the trail that satisfy a range of archaeological, ecological and landscape constraints.

f. Evaluate the carrying capacity and threshold points of these prescribed treatments given models of visitor distribution.

g. Estimate the likely costs of the management treatments prescribed.

4. Approach to the Study

This work should include:

a. A comprehensive assessment of the fabric and composition of known archaeological features that make up the scheduled monument. Evidence of past and present erosion of these features should be evaluated in order to determine their relative sensitivity to visitor pressure. Sources of information should include the principle custodians of the wall that have long term experience of maintaining and managing the monument. These include; English Heritage, the Royal Commission on the Historic Monuments of England, The National Trust, the County Archaeologists of Cumbria and Northumberland.

b. An evaluation of available statistical data on the distribution and pattern of visitors to the major fort sites and existing rights of way along the monument. Comparable data should also be collected on the use of established National Trail routes, particularly those with similar
components of distance, terrain and archaeological interest. Sources of information include the Countryside Commission; the project officers of the Ridgeway, Offas Dyke, Peddars Way and Wolds Way.

c. A literature search should be undertaken to bring together existing research on the impact of visitors to archaeological sites in Britain. The work should mainly be a desk exercise to collate the findings of others, in order to identify the critical components - eg archaeological features most at threat, physical characteristics of the site, visitor management and distribution.

d. An analysis of the Countryside Commission Baseline Condition Survey data collected for the Hadrian's Wall national trail in order to identify:

   i. the location of known archaeological sites within a 5 metre corridor of the route alignment;

   ii. the physical characteristics and condition of the surface around each site.

The earlier Pennine Way Baseline Condition Survey should also be used to compare the change of recorded wear at a sample of sites along the central section of Hadrian's Wall.

e. Each archaeological feature should be assessed and scored on its intrinsic vulnerability to visitor damage.

f. Research into the protection of grassland on archaeological sites. An assessment of the success of hard and soft surface treatments to combat erosion should be made, and the effects of these solutions on the fabric of the monument. This should pull together and build upon existing research material.

g. An assessment of current research into the use of minimum intervention treatments for the repair of worn footpaths, particularly the use of a range of vegetation management techniques for the reinforcement and restoration of mineral soil footpaths. Suggested sources include the Pennine Way, Cleveland Way and Three Peaks Project.

h. An assessment of the acceptability of using these treatments within a variety of landscape settings of the monument. Particular attention should be given to their archaeological and ecological impact.

In general terms it is anticipated that the study will be largely desk-based. There will need to be some field work but it is envisaged that this will be ancillary and subsidiary to a desk-based approach. It is envisaged that field work is likely to be largely on a sampling and checking basis. A detailed field survey approach is not envisaged.

5. Methodology

The methodology should include the following:

a. A classification system should be developed for a comprehensive range of archaeological features associated with the monument and ranked in order of sensitivity to visitor damage. A model for the assessment
of each type of archaeological feature will be a cumulative score of its key components. Suggested components would probably include the following items although consultants will be expected to formulate a comprehensive list:

- feature of archaeology
- archaeological form and composition
- proximity of the proposed route alignment to the feature
- evidence of damage to the archaeology
- cause of damage to the archaeology
- estimates visitor activity
- ecological status
- geological type

b. This data will require computer handling and must be presented in a form that is compatible with the Baseline Condition Survey data.

c. This model should be developed further to take into account the physical characteristics of the ground conditions which will influence the site's vulnerability to damage. This will include:

<table>
<thead>
<tr>
<th>Terrain Type</th>
<th>Path surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Type</td>
<td>Path condition</td>
</tr>
<tr>
<td>Drainage</td>
<td>Causes of erosion</td>
</tr>
<tr>
<td>Land Use</td>
<td>Pressure points</td>
</tr>
</tbody>
</table>

d. The output of this model will be a classification system comprising the types of archaeological feature coupled with a range of key components which are scored and ranked in order of "archaeological sensitivity".

e. A sampling strategy should be adopted to locate the position of a number of key sensitive archaeological sites across the monument. Criteria for sampling will include:

- archaeological features with a 5 metre corridor of the proposed route alignment;

- a broad spectrum of ground condition class types;

- sections of the route where new rights of way are to be created, and there is no current evidence of use;

- a random sample throughout the length of the route.

Each of these "key sensitive sites" should be assessed for their ability to sustain given models of visitor activity, and a range of surface intervention or path realignment considered in order to protect the fabric of the archaeology.

6. Data Collection

Detailed records of the alignment and form of known Roman archaeology are held on a 1:2500 OS map base by the Royal Commission on the Historic Monument of England. A charge may be made for the use of their records.
A record of the proposed route alignment for the Hadrian's Wall National Trail is drawn on 30 No. 1:10,000 OS base maps as determined from the field survey. The detailed alignment is subject to some variation based upon further consultation and the findings of this research. Comprehensive records of the physical characteristics and condition of the proposed route are held on sheet pro formas, and referenced to the 1:10,000 OS base maps.

7. **Output**

This will include:

a. A comprehensive record of the key sensitive archaeological sites should be drawn up on clean copies of 30 No. 1:10,000 OS base maps covering the full length of the route.

b. A model of the classification system used. This should set out the full range of archaeological features identified coupled with combinations of key components, and the scoring system developed.

c. A strategic picture of predicted visitor distribution across the length of the route should be drawn on a 100,000 map base, illustrating patterns of use for the trail, the major fort sites and other main attractions.

d. A specification of surface treatments, including costings, involving minimal intervention should be recommended for a broad range of site constraints and conditions. This should include a range of vegetation management treatments that would be capable of sustaining a greensward path. Management prescriptions should specify:

   i. Fertilisers: types, application rates, timing.

   ii. Seed mixes: assessment of available cultivars most appropriate to grassland types along the trail.

e. A summary report should illustrate the total length of intervention necessary to protect the scheduled monument with an inventory of recommended treatments required for each classification of archaeological site.

f. All of the results and output of the research should be drawn together in a final report which also contains a clear and concise executive summary. Six copies of a final report will be required. Consultants will also supply an IBM compatible floppy disk of their final project report.

8. **Project Supervision and Management**

The project will be managed by Bob Chambers of the Countryside Commission’s Northern Regional Office.

A Steering Group will be established to advise and guide the consultants during the contract period. This will be chaired by Bob Chambers and will include representation from English Heritage on it. The Steering Group will meet at least three times during the course of the contract. Meetings will be in Newcastle or at a mutually agreed location.
A draft report will be produced and presented to the Steering Group for discussion and amendment before production of a final report.

9. Other Conditions

The study will be done under contract to the Countryside Commission and will be subject to its standard conditions for research and experimental projects. Ownership and copyright of the project material will belong to the Commission and English Heritage.

10. Programme

The study will be completed within a maximum 10-12 week period. Following receipt of written submissions successfully shortlisted consultants will be invited to attend for interview in Newcastle. It is envisaged that a contract will be let shortly after interviews. The successful consultant will be expected to begin the study immediately after being awarded the contract.

11. Budget

The project is a joint initiative between the Countryside Commission and English Heritage. It is a jointly funded study. There is no set budget but as a guideline it is anticipated and expected that submissions will not exceed a maximum of £20,000. This does not mean and should not be interpreted that there is an expectation that submissions will necessarily be in the order of £20,000. As a guideline it should be noted that it is the Commission's normal practice and policy to accept the lowest tender submission.

12. Submissions

Consultants are invited to make a written submission to the Commission outlining:

   a. how they propose to undertake the study;
   b. their qualifications and relevant experience;
   c. a detailed breakdown of costs;
   d. VAT should be included, where appropriate, but calculated and shown separately;
   e. travel and subsistence costs should be detailed but shown separately;
   f. the team and consultants who would undertake the study.

Three copies of the submission should be sent to Judith Withers, Countryside Commission, Northern Regional Office, Warwick House, Grantham Road, Newcastle upon Tyne NE1 2QF by

Envelopes should be marked 'Competitive Tender, Hadrian's Wall National Trail - not to be opened before

BOB CHAMBERS
October 1991
Annex B

Review of Available Management Techniques
In this annex a very brief review of current management techniques is outlined. A much fuller review is included in the recent ITE draft report to the Countryside Commission on the management of impacts of recreation on soils and vegetation.
B2.1 SOIL EROSION MINIMALISATION

In order to minimise soil erosion, paths should seek to incorporate the following:

- stable upper soil layers with smooth surface;
- good drainage;
- avoidance of steep slopes especially where directed downhill;
- minimise stream crossings;
- good vegetation cover;
- siting through rough terrain.

B2.2 SOIL PROTECTION

- Vegetation - natural and highly effective technique to reduce erosion; (risk of erosion continues during period of establishment).

- Geotextiles - come in three main types:
  - surface nettings;
  - partly buried 3D nettings;
  - subsurface cellular webs.

The majority of these geotextiles have been developed for large-scale civil engineering projects and their effectiveness varies according to the situation, as does the cost. Manufacturers claims also make selection difficult and few field trails have been conducted to assess their effectiveness for recreation sites. However trials at Stonehenge indicate "Nottsward" may be particularly effective (see Section 5.2).

- Surface glues - form a porous surface skin and are best suited to short term usage. There are a large number on the market and while most will perform adequately, there is a need for more laboratory testing to assess effectiveness on particular soil types and any possible toxic effects.

- Surface moulding - involves the cutting of horizontal ledges into slopes and although it is in regular use abroad it has not been tried extensively in this country under British climatic conditions.

A summary of the relative effectiveness of these four protection types is provided in Table B2.2a below. This information is taken from the unpublished draft report by ITE.
### Table B2.2a  Effectiveness of Soil Erosion Protection Types

<table>
<thead>
<tr>
<th>Property</th>
<th>Increase Permeability</th>
<th>Reduce Impact of Rain</th>
<th>Reduce Velocity of Run-off</th>
<th>Surface Stabilisation</th>
<th>Trap Sediment</th>
<th>Subsurface Stabilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>**</td>
<td>**</td>
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<tr>
<td>Geotextiles</td>
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<td>Jute</td>
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<tr>
<td>Netting</td>
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<tr>
<td>Enka Mat</td>
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<tr>
<td>Geoweb</td>
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<td>Mesh</td>
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<td>Elements</td>
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<tr>
<td>Mulch Mats</td>
<td>**</td>
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<tr>
<td>Surface Glues</td>
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<tr>
<td>Surface Moulding</td>
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</tr>
</tbody>
</table>

** very effective
* moderately effective

### B2.3  Options for Maintaining and Restoring Vegetation

Where paths have received little maintenance and are now in need of restoration to increase their trafficability (resistance to wear). Suitable techniques include:

- **Improved drainage and aeration** - it has been recognised (BTCV 1983) that poor drainage is the cause of most problems related to path management. Waterlogging compounded by trampling prevents vegetation growth. Approaches to this problem are:
  - unblock existing blocked drains;
  - install a new drainage system;
  - lay surfacing material on the path which does not erode when wet or will lift the path above the level of standing water;
  - construct a boardwalk;
  - aerate the path either by hand forking or by mechanical aerator;
  - re-route the path and manage it so the problem does not redevelop.

- **Use of fertilisers to increase the resilience of vegetation** - sports and recreation grounds frequently treat turf with fertilisers as a method of...
replacing the nutrients lost by regular cutting and the damage done by wear and tear. Whilst not being regularly used on rural sites, recent trials (ITE unpublished) suggest that at some sites improvements may result from the use of fertiliser. Further work is required though before clear guidelines for fertiliser use on rural areas can definitely be recommended.

- **Closure of sections of a path to allow vegetation to recover** - for areas where paths receive heavy use or the use is likely to create excessive wear and tear it is important that an attempt is made to allow it to rest. This may be achieved by closing the path for a long enough period of time to allow recovery on a regular basis. With the exception of Calluna which does not recover well after damage, many vegetation types have the ability to recover within a short time period of a few weeks assuming the initial wear has not been severely damaging (Harrison 1981).

- **Physical reinforcement of surface vegetation by durable materials** - these techniques rely on the provision of durable reinforcing materials at the vegetation surface that withstand much of the traffic wear and improve the survival of the vegetation. Such methods are usually only employed at very heavily used locations in order to prevent the complete loss of vegetation. Typical examples include:
  
  - stone mosaics;
  - stone / concrete slabs;
  - plastic grids and grasscrete;
  - boardwalks;
  - surface geotextiles;
  - grassed gravel;

Where possible, measures should be taken to implement trails and paths using as little artificial material as possible, but instead using the natural materials already present on site, thereby adopting a minimum intervention approach.

- **Intensive management.**

**B2.4 REVIEW OF MANAGEMENT TECHNIQUES AT OTHER SITES**

Table B2.4a gives a brief review of management techniques which have been tried on other footpaths suffering from visitor pressure. Most work has been done on peat and there is apparently little relevant reported research for mineral footpaths. It is evident from discussion with trail officers that other restoration work has taken place on mineral footpaths but very little of this work has been written up.
<table>
<thead>
<tr>
<th>Site</th>
<th>Aim</th>
<th>Technique</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennine Way (South)</td>
<td>Restoration over peat (Countryside Commission)</td>
<td>Snow fence paling</td>
<td>Effective, but visual eyesore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Floating path using Typar geotextile covered with crushed gristone</td>
<td>Uncertain. Often insufficient, resulting in adjacent unprotected vegetation becoming a quagmire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bundles of brushings, fence posts, woodchippings and palings</td>
<td>Some good results, but quality varied</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paraweb matting</td>
<td>Matting became torn, unsightly and difficult to walk on. Eventually removed for safety purposes and fence palings substituted</td>
</tr>
<tr>
<td>Path through peat</td>
<td>Removal of peat to expose mineral soil or bedrock. Create artificial groughs by cutting to bedrock</td>
<td></td>
<td>Provides good firm walking surface</td>
</tr>
<tr>
<td>Path across peat</td>
<td>Timber trestle resting on bedrock with stone top dressing</td>
<td>Durable solution on wet site</td>
<td>Initially excellent, both structurally and visually, but blocks formed a dam and split under the pressure which then moved and caused disruption to structure. Duck boarding reinstated. Could prove effective on sites with difficult drainage characteristics</td>
</tr>
<tr>
<td>Pennine Way (North)</td>
<td>Path across peat (Northumberland National Park)</td>
<td>Timber boardwalk</td>
<td>Results of variable quality depending on care and attention, follow up landscaping and maintenance</td>
</tr>
<tr>
<td>Site</td>
<td>Aim</td>
<td>Technique</td>
<td>Outcome</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------</td>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Speyside Project (Countryside Commission for Scotland)</td>
<td>Path across peat</td>
<td>Raft paths. Cut track lined with Terram and stone or sand filling</td>
<td>Durable solution that was visually acceptable</td>
</tr>
<tr>
<td>Traditional</td>
<td>Path across peat</td>
<td>Stone flags</td>
<td>More appropriate in shallow areas and durability of heavy unsupported stone on deep peat unknown. Also depends on quality of rock available. Possible to use a geogrid as a foundation</td>
</tr>
<tr>
<td>Creag Meagaidh (Nature Conservancy Council)</td>
<td>Path across peat</td>
<td>Removal of peat to expose mineral soil or bedrock. Create artificial groughs by cutting to bedrock</td>
<td>Provides good, firm walking surface</td>
</tr>
<tr>
<td>Lake District</td>
<td>Path across mineral soils</td>
<td>Drystone Pitching</td>
<td>Relevant to rocky mountains areas. Paths built in Grand Canyon 100 years ago by this technique still mostly intact and regularly used by walkers today</td>
</tr>
<tr>
<td>Yorkshire Dales</td>
<td>Paths across mineral soils</td>
<td>Cement additive with rotavated clay soil to provide a smooth concrete like surface</td>
<td>Tests failed because of high mixture of humus from surface layers and high concentration of cement powder resulting in high susceptibility to frost damage. Better results in the south</td>
</tr>
<tr>
<td>Bronte Way</td>
<td>Path across peat</td>
<td>Raft path trial using geotextile grid and stone sandwich</td>
<td>Uncertain</td>
</tr>
<tr>
<td>West Highland Way</td>
<td>Path across peat</td>
<td>Lotrak geotextile covered with two grades of stone. Built using a Hymac excavator</td>
<td>Recent technique and long term durability unproven</td>
</tr>
<tr>
<td>Stonehenge</td>
<td>Prevent visitor wear on path leading to the stone circle</td>
<td>Gravel chip pathway</td>
<td>Effective for a number of years</td>
</tr>
<tr>
<td>Site</td>
<td>Aim</td>
<td>Technique</td>
<td>Outcome</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Grass reinforcement</td>
<td>Netlon mesh elements and Johnsons Sportsmaster mix</td>
<td>Found to be unsuitable for the site. Eroded in many places with the mesh showing through. Surface became compacted and uneven</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nottsward and Johnsons Sportsmaster mix plus grass cutting</td>
<td>Performed well and did prevent erosion, maybe particularly useful in wet conditions for small areas</td>
</tr>
<tr>
<td></td>
<td>Returfing / reseeding</td>
<td></td>
<td>Often showed deterioration during wet weather but overall results were as good as the reinforced materials</td>
</tr>
</tbody>
</table>
| Three Peaks Footpaths        | Reinstatement of vegetation              | Seed mixtures using 6 varieties designed to produce predominantly grassy swards | Considerable differences were observed in species composition even between plots sown with the same mixture, probably due to wetness and degree of exposure. The mixture comprising agricultural grasses and Holcus lanatus (Yorkshire Fog) was most successful. Mixtures composed entirely of upland species had good potential for general purpose usage on wet and peaty surfaces. Addition of plant litter appeared a promising way to increase species diversity and cover.  
Fertilisers including Vitax Q4, Enmag and ground limestone and combinations of fertiliser and limestone | Standard treatments less effective than when used in conjunction with ground limestone. Heavier rates of fertiliser appear to be counter productive. Labour intensive |
<table>
<thead>
<tr>
<th>Site</th>
<th>Aim</th>
<th>Technique</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplanting using turf, stretched turf</td>
<td>Effectively to create rapid plant</td>
<td>Labour intensive.</td>
<td>Does not suffer from heavy grazing.</td>
</tr>
<tr>
<td>and divots with and without fertiliser</td>
<td>cover and texture.</td>
<td>Fertiliser must be chosen to suite the species</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fertilisers for use on damaged vegetation</td>
<td>Preliminary results indicate increases in</td>
<td></td>
<td>Need for further work</td>
</tr>
<tr>
<td></td>
<td>plant cover at both high and low rates of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>application.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The information included within this table has arisen from several sources notably the Pennine Way Management Project (Countryside Commission 1991), A Study of Wear and Tear Around Ancient Monuments (Land Use Consultants 1988), The Three Peaks Project (Institute of Terrestrial Ecology 1986), Speyside Project (Countryside Commission for Scotland 1975). The Cleveland Way Management Strategy was consulted, however, no specific details proved relevant to this table.