# THE VALUE OF CYCLING IN THE HIGHLANDS AND ISLANDS OF SCOTLAND


**Final report**

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# Contents

## Executive Summary

This review has been commissioned by the Highland Cycle Forum to address gaps in knowledge relating to the value of cycling in the Highlands and Islands. There is a need to ensure that the broad economic, social and environmental benefits are recognised when planning future programmes by the public agencies. The geographic scope is the area covered by Highlands and Islands Enterprise.

It is increasingly being recognised by government that cross-sector benefits have been underestimated in appraisal and funding decisions. The broad benefits of cycling mean that investment in cycling projects is likely to have been adversely affected by joint working problems, and a new appraisal framework is currently being put in place by Government to encourage cross sector evaluation and delivery. Cycle investment has much to gain from this.

The main quantifiable benefits from cycling fall within three main sectors. When appraising ***transport*** benefits of cycling it is important to emphasise that cycle investment makes a small positive impact on a very wide range of criteria, as opposed to other interventions such as investment in air services or in new roads which tend to be dominated by benefits under the economy criterion. ***Health*** benefits of more cycling include: reduction in risk for a range of diseases, mental well-being and self esteem, reduced impact of air pollution for cyclists when compared with motorised travel, and safety benefits for all cyclists. The cycle ***tourism*** market is a large and growing sector for the economy of the area and is made up of: day-trip cyclists, main activity holiday cyclists, other holiday cyclists, specialist tours, and competitive cyclists.

Based on data from these sectors from across the HIE area, cycling is currently worth around £40 million[1] p.a. to the economy and this could grow by well over £20 million with well planned investment. As summarised in table (i) below, tourism accounts for the largest component of this and it should be recognised that investment will be needed to maintain this value, particularly in highly competitive national and international markets.

***Table (i): The Value of Cycling in the HIE Area***

| Element | Estimated total current value | Estimated future value after investment |
|---|---|---|
| Transport | £9 million | Doubling cycling in line with national target equivalent to £4.5 million |
| Health | Substantial but unquantifiable | Benefits of £10 - 15 million could be achieved |
| Tourism | £30 million | Future investment should be able to cover its costs to maintain or increase this |
| Other | Large and unquantifiable | Well-planned investment should provide significant value |
| Total value per annum | Estimated at £39 million[1] as minimum | Benefits worth more than £20 million should be possible |

[1] Single figure estimated from ranges of values. See Section 4.0. Health and other elements not included.

Investing in cycling can therefore make a significant contribution to the economy and quality of life in the area. Interventions need to tackle issues broadly with joint working between many public and private agencies. Initiatives such as safer routes to school and business travel plans have shown what can be achieved and these partnership approaches should allow each stakeholder to contribute according to the benefits they receive. By identifying systematically the stakes which each partner can bring to improve cycling, solutions can be identified and delivered which are both fundable and effective.

Within these partnership planning approaches to capture the value of cycling, initiatives should include:

- Marketing the cycle tourism opportunities,
- Health and general cycle promotion,
- Infrastructure changes including routes and facilities, traffic calming, traffic management/quiet lanes, town centre management, off-road / forest cycling facilities, safe links to local leisure routes and long-distance routes,
- Workplace/destination based facilities/parking/lockers etc,
- Cycle centres/specialist facilities,
- Cycle sales/repair.

Ultimately success will depend upon correctly identifying user needs and tackling them in ways that can gain acceptance from the target group. Building ownership of cycle based solutions takes time and needs to be supported with practical information, training and marketing to ensure the theoretical value is realised in practice.

# 1.0 Introduction and Scope of the Study

## *Approach*

1.1 The value of cycling to society is highlighted in national and local publicity on health, economic, transport and social policy initiatives. There are many factors affecting how this value is perceived and the extent to which it is reflected in current decision making structures. There is therefore a need to stand back and investigate whether or not the value of cycling is fully recognised by all relevant stakeholders.

1.2 This review has been commissioned by the Highland Cycle Forum to address gaps in knowledge relating to the value of cycling in the Highland and Islands. There is a need to ensure that the broad economic, social and environmental benefits are recognised when planning future programmes by the public agencies.

1.3 The project has been undertaken by DHC between September and November 2003. It has comprised a

- Review of regional, national and international research literature on the benefits of cycling.
- Review of local research and data on cycling in the region.
- Estimation of the current value of cycling in the area.
- An assessment of potential return on cycle related investment.

1.4 The geographic scope was the area covered by Highlands and Islands Enterprise - Highland, Moray, part of Argyll & Bute, Arran and the Cumbraes, Orkney, Shetland, and the Western Isles. In some cases, information is only available for smaller areas within this region. Estimates or other indications are shown where this is the case.

1.5 The work does not include a detailed assessment of schemes but rather a strategic overview of the issues to guide detailed scheme development in the future. The costs and benefits are therefore expressed in broad terms covering the main types of benefit. It should not be assumed that all these benefits, or indeed any of them, would be attained from any individual project so this review is not a substitute for detailed and broadly based scheme appraisal.

## *Background*

1.6 It is increasingly being recognised by government that cross-sector benefits have been underestimated in appraisal and funding decisions. The broad benefits of cycling therefore mean that investment in cycling projects is likely to have been adversely affected by joint working problems, but there has been no systematic review of this. Nevertheless it can be identified that other modes of transport such as car, air, bus and rail have negative environmental and sometimes health impacts.

The environmental and health aspects are also the hardest to quantify. There is therefore a risk, if not detailed evidence, that cycle investment, which can deliver complementary benefits across a wider range of sectors, can be underestimated relative to motorised modes.

1.7 An appraisal framework is currently being put in place by Government (Treasury 2003) that encourages cross sector evaluation and delivery. It is anticipated that such approaches will increasingly become the norm. Cycle schemes have been trailblazers in the transport sector for joint working approaches with schemes across Scotland developing partnerships between economic development, health, transport, social inclusion, education, social work, tourism, commercial companies and other sectors (Scottish Executive 2001a).

1.8 These changes take place within an evolving national framework for transport. A consultation is currently underway on the future roles and responsibilities of a national transport agency to deliver planned increased investment levels. It is recognised that the value of cycling should be reflected in these emerging administrative structures but the mechanisms for achieving this are not yet defined.

1.9 Whatever framework emerges should enable and support local organisations to work in partnership to deliver broadly based initiatives. Good progress has already been made through the Highland Cycle Forum which needs to be built upon.

1.10 The Highland Cycle Forum is a partnership organisation that was set up in the Highland area in 1997. The Highland Cycle Forum co-ordinated and prepared the Highland Cycling Strategy in 2000. The vision aims and purpose of the strategy are summarised in Table 1

***Table 1: The Highland Cycling Strategy***

| | |
|---|---|
| Vision | To fulfil the potential of the Highlands as a place where cycling is a safe, attractive and accessible mode of transport and recreation for all. |
| Aim | To promote and encourage an increase in the proportion of journeys taken by cycle to the economic, health, social and environmental benefit of the Highlands. |
| Purpose | Cycling is an economic, healthy, socially inclusive and environmentally friendly means of transport and leisure activity. The Highland Cycling Strategy seeks to:<br>• Increase awareness and understanding of the benefits of cycling<br>• Establish a framework within which participating organisations can develop initiatives to promote cycling<br>• Co-ordinate funding for cycling development<br>• Set out roles and responsibilities for partner organisations<br>• Develop a cycling action plan and establish appropriate targets and indicators |

1.11 Locally in the Highlands and Islands area, several studies have highlighted the importance of cycling to the economy. These have identified that cycling is a significant component of tourism and that the

benefits of this are increasingly important for the economy. Other studies have identified benefits of particular schemes for business travel, school travel, the local environment, the health of the population, and community development. These fragmentary sources provide a substantial evidence base but in a form which cannot readily be used to highlight the value of cycling at a strategic policy level, or to support applications for funding at a local level.

1.12 This report seeks to provide a coherent overview of the value of cycling, which can help to raise understanding and support practical policies and initiatives in the future. To achieve this, the evidence base is reviewed in Chapters 2 to 4 allowing options for future investment to be reviewed in Chapters 5.

# 2.0 Identifying the Benefits of Cycling

### *Appraisal context*

2.1 For each stakeholder who contributes time, money or materials towards initiatives which benefit cycling, an appraisal is made, explicitly or more often implicitly, of the benefits of making the investment. The benefits that affect the party making the investment are considered to be the primary benefits, and the benefits affecting others are considered to be secondary benefits. It is important to consider primary and secondary benefits separately since it will be the primary benefits for any individual or organisation which will determine whether there is any motivation to make the investment level whilst recognising that:

- For public policy appraisal, sustainable development principles underlie the way that most success is measured and around which government investment programmes are structured and resourced. Benefits are measured broadly in terms of their contribution to a strong economy, an inclusive society and a clean environment.

- Members of the public may make an investment of time because of the satisfaction they receive from contributing to society, and funding support from private businesses may improve the public image of the company in addition to contributing to local community.

- For private companies sustainability principles are also good practice since, although the primary role may be the economic goals, failure to provide benefits to all people or adopt efficient environmental practices will in the long term lead to failure.

2.2 When considering secondary benefits it is particularly important to ensure that double counting is avoided to ensure that the value of cycling is being correctly represented. A useful starting point is therefore to look at who benefits and in what way.

### *Who benefits*

2.3 The National Cycling Strategy (2003) identifies benefits of cycling as including:

- **Health** - cycling can improve health by lowering the risk of heart disease, shedding excess weight, and increasing fitness.
- **Environment** – increasing cycling benefits the environment by cutting CO2 emissions and reducing noise.
- **Congestion** – promoting cycling can have benefits in reducing traffic congestion.

- **Education** – the establishment of safer routes to schools and cycle training should increase awareness of road safety issues and improve road safety.
- **Social Inclusion** – safer cycle routes and more people using them can help build stronger communities.
- **Access to Employment** - by making it easier for people to get to work by bicycle employers increase the potential labour force available to them.
- **Sustainable Tourism** – The development of more widespread cycle routes will enhance access to the countryside and open up new opportunities for tourism. Rural economies will benefit from the increase in passing trade.

2.4 These benefits are recognised locally within the Highlands and Islands area within many plans, policies and activities. Table 2 summarises the primary benefits by stakeholder.

***Table 2: Stakeholders in Cycling in the Highlands and Islands***

| Organisation | Stake | Primary benefits |
|---|---|---|
| ***Public Bodies*** | | |
| The Councils | Framework for cycling in local transport strategy, reduction in traffic in e.g. Inverness; promotion of safe route to schools; inclusion of cycling provision in new developments | • Reduction of traffic congestion / pollution<br>• Improved access to local facilities by cycling<br>• Safer healthier environment |
| Highlands and Islands Enterprise, LECS, SIPS | Support new cycling related business opportunities and community/regeneration projects (off road centres, cycle hire, cycle transport, guided tours, events/ competitions, cycle repair etc.) | • Create new income and jobs into area<br>• Open up new markets<br>• Enhancement of current cycling-related businesses<br>• Development of intermediate labour markets and entry level jobs. |
| Health Boards/NHS Trusts | Promote cycling as part of healthy active lifestyle | • Increase in health of population<br>• Reduce burden on NHS<br>• Employee travel |
| Area Tourist Boards/ VisitScotland | Promote Highland as an area for cycling (off and on road) | • Increase in income from cycle tourism<br>• Enhance visitor activity options<br>• Increased visitor numbers and duration of stay<br>• Reduced transport impact on visitor attractions |
| Businesses | Promote cycling through funding improvements (bike shelters, security, pool bikes, showers, cycle routes etc.) | • Enhanced environmental image<br>• Fit and healthy workforce (links to. SHAW for example)<br>• Develop links with local community<br>• Infrastructure costs savings |
| Schools | Promote cycling through promotion of SRTS, improvements in bike storage/security | • Fitter, healthier, more alert students and staff.<br>• Improved social development for |

| | | |
|---|---|---|
| | | students. |
| Forestry Commission Scotland | Create opportunities for people to enjoy forests; help communities benefits from forests (e.g. through cycle routes/ centres) | • Making better use of forested areas.<br>• Forging links between community, society, local employment, tourism etc. |
| Scottish National Heritage | Promote access and enjoyment, and to conserve natural heritage | • Enhanced and sustainable access to the countryside. |
| HITRANS | Enhance cycling on transport network | • Environmental and congestion benefits<br>• Enhance buses/ rail network through encouragement of cycle carriage<br>• Develop links between transport and economic development particularly cycle tourism. |
| Highland Rail Partnership | Increase integration of rail with other transport forms / enhance cycle carrying facilities | • Increased use of cycle carrying rail transport facilities<br>• Facilitates cycle tourism / greater use of rail |
| British Waterways | Promotion of canals/ rivers as a leisure resource, and to improve accessibility | • Cycling promotes canal use and profile, links with national cycle network<br>• Community links |
| **Other Interested Groups** | | |
| Bus Operators | Create / Enhance cycle carrying facilities on bus network | • Increased use of cycle carrying bus transport facilities<br>• Facilitates cycle tourism / greater use of rail |
| Highlands and Islands Airports Limited | Enhance cycle carrying on air travel, encourage, through infrastructure improvements, cycling to airport. | • Enhanced environmental image<br>• Increase cycle using passengers |
| Community Councils | Developing better places to live and work | • Enhancement of local environments<br>• Increase local access options |
| Tourists / Visitors | Desire to have enjoyable vacation/ break in Highlands | • Increase of cycling-related holiday options<br>• Enhanced enjoyment of visit |
| Employees | Develop demand for cycle facilities | • Improved fitness<br>• Save money<br>• More commuting / travel to work options |
| Third sector groups e.g. Sustrans, CTC | Promote cycling as alternative for travel – (national cycle network, safe routes, information dissemination) | • Environmental benefits and sustainability<br>• Reduction of traffic congestion / pollution |

2.5 The table therefore broadly reflects the values in the national cycle strategy. Before moving on to estimate the value of these benefits within the Highlands and Islands, the elements that comprise the main transport, health, economic development, social and environmental benefits are discussed below.

### *Transport benefits*

2.6 The recently issued Scottish Transport Appraisal Guidance (Scottish Executive 2003) (STAG) makes clear that transport investment, including cycling, should be objectives led. Rather than start with a cycle scheme and see how to justify it, cycle solutions should in future be considered as transport interventions only if they are the best way of tackling the defined problems.

2.7 When planning cycling investment, planners therefore need to highlight the benefits under the following STAG criteria:

- Accessibility and social inclusion – Access by cycling to local facilities, improvements in the affordability of transport, and the distribution of impacts by people group and geographical area.
- Safety – Reducing cycling casualties particularly recognising the higher than average cycle casualty levels in some places.
- Environment – Emission reductions, air quality improvements and noise reduction.
- Economy – Location impacts and travel cost/time savings.

2.8 In relative terms, the impacts of cycling investment can be relatively small on issues such as:

- Reduced parking requirements
- Improved environment: air quality, noise
- Reduced traffic levels & congestion
- Economic benefits

2.9 When appraising transport benefits of cycling it is therefore important to emphasise that investment makes a small impact on a very wide range of criteria. This contrasts with other transport investment such as in air services or in new roads, which deliver most of their benefits under one or two criteria e.g. economy.

2.10 Transport appraisal should recognise the potential for joint funding of projects. Jointly funded projects are likely to be given a higher priority particularly if stakeholders show that costs and benefits have been shared equitably amongst partners. It would also not be appropriate for public funds allocated to transport to be used to support predominantly private benefits or investment in predominantly non transport benefits. In all cases the benefits to each stakeholder should be reflected in the funding contributions made.

2.11 STAG appraisal also requires the consistency of transport benefits with other benefits to be assessed. This is separate from the quantification of the non transport benefits discussed below, and within STAG these are

considered under the integration criterion. The benefits are identified in terms of the synergy between transport and other policy and in appraisal the distinction between increasing cycling and decreasing car use is important to understand. These two objectives are not necessarily linked directly, but appropriate tools and measures may succeed in affecting both as follows:

- Increasing cycling will lead to improved health, fitness, cost savings, accessibility etc. for the individuals involved. This can be gained via increasing *leisure* and *utility* cycling.
- Decreased car use may lead to secondary benefits such as reduced congestion, improved environment. This will be particularly gained by increasing *utility* cycling, especially for commuting and shopping trips.

### *Health*

2.12 The health benefits of cycling have been well documented in several publications. A summary of the main findings is included at Appendix A. This highlights that the Scottish population is becoming increasingly sedentary and this is creating a burden on the health services. It identifies that the benefits of cycling substantially outweigh costs (e.g. cycling road casualties), and that cycling is an activity that should be promoted as part of a healthy lifestyle.

2.13 Key benefits are associated with an active lifestyle generally rather than cycling specifically and include:

- Mental well-being and self esteem, with inactive people being more likely to suffer from depression.
- Reduction in risk for a range of diseases, including: coronary heart disease (CHD); stroke; Type 2 (formerly "late onset") diabetes; some cancers; and obesity and related diseases.

2.14 Other health benefits may be less obvious but it has been found that:

- The impacts of air pollution are lower for cyclists when compared with motorists. Despite breathing two to three times as much air as motorists due to physical exertion, cyclists breathe lower levels of pollutants.
- The risks of cycling need to be minimised through safe cycling behaviour and facilities, and the risk involved in cycling decreases per cyclist as the number of cyclists increases.

### *Tourism*

2.15 A major issue, that is particularly important for the Highlands and Islands area, is the ways in which local businesses and others can benefit from cycle tourism and leisure cycling. The different markets and

activities which make up tourist / leisure cycling can be divided into several groups and the requirements of these groups vary considerably, as do their spending levels within the local economy.

- Day-trip cyclists - those visiting an area for the specific purpose of cycling activity. Includes those visiting purpose-built facilities.
- Main activity holiday cyclists - those staying a length of time, with cycling being the main focus of their activities.
- Holiday cyclists - those on general holidays who may undertake cycling using their own or hired bikes.
- Specialist Tourers - those touring the region/ country using mainly the bike as form of transport.
- Competitive cyclists and those engaging in mass participation events can also be considered, but their overall contribution is small compared to the four other categories above.

2.16 These groups can be further disaggregated by type of cycle that is most appropriate on different facilities e.g. mountain bike, touring cycle, dedicated road cycle but suitability will depend very much on local conditions and facilities.

2.17 Casual leisure cycling makes up the largest part of Scotland's cycling market. In 1994, there were an estimated 423 million leisure day trips, of which 5.97m were leisure cycling and mountain biking day trips. (Peter Scott Planning Services, 1996). This is a large and growing market[2] which is supporting local shops and facilities through their spending patterns. Although specialist holiday cycling is a small section of the cycle tourism market, touring cyclists are potentially the highest spenders, and are more likely to include groups from further afield.

2.18 Within Scotland, cycle tourism forms only a small proportion of tourist revenue generated (7%). In the Western Isles and Argyll & Bute, around 10% of all visitors take part in cycling or mountain biking as part of their holiday, contributing to a total annual expenditure of £180 Million in these areas. Many of these tourists will spend money at locally owned and run facilities (Lumsdon 1996) but further research would be needed to understand the proportion of spend by type of area for the Highlands and Islands. In most cases the cycle market in HIE is based on cycling on quiet signed on-road routes, so the infrastructure investment to increase the number of cyclists is not likely to be large. Where tourists are cycling as part of their holiday as opposed to cycling being the main activity, income generated per trip is higher and these tourists tend to stay slightly longer as well (HIE, undated). One off events, such as the

[2] Cycling is identified as a tourism market segment with "Very Good Prospects" by scotexchange.net

Mountain Bike World Cup can bring significant economic benefits (Taylor, 2003).

2.19 Off-road and forest cycling facilities are an important aspect of cycle tourism development. Increases in quiet road or off-road cycling levels on the national cycle network have been greater than overall levels of cycling (Sustrans, 2003b). Further details of benefits accrued from particular facilities in the Scottish Borders and Wales are provided in Appendix B.

***Other economic, social and environmental benefits***

2.20 Bicycles are inexpensive to own and maintain. Car owners who already own a suitable bike save the difference in operating costs by switching modes, which can be substantial. Typical expenses paid by organisations for private car use are 40p per mile, taking account of fuel, insurance, and depreciation. If car running costs are paid by a company or organisation there will be much less incentive to switch modes to gain financially. However there is potential for more organisations to cover cycle running costs which could reduce such incentives in the future.

2.21 Other costs involved with car use such as parking can also be significant allowing individuals to make savings by using cycles.

2.22 A mode shift to cycling, either individually or integrated with public transport modes could lead to small reductions in congestion. The most beneficial effects will be at key locations such as outside school gates where a modal switch to cycling could result in everyone being able to undertake their travel more efficiently and cheaply.

2.23 Maintenance costs for cycling facilities are not high when compared to overall road maintenance costs, although it can be more difficult to attract funding for maintenance than for new build (Baptie, 2003). However, timely maintenance is a benefit for all road and footpath users including walkers, and maintenance regimes should deliver best value for all road users. Although cyclists and walkers do not pay road tax (for these modes) this is not an argument that cycle infrastructure maintenance should be neglected since there is no direct hypothecation of road tax to road maintenance.

2.24 Cycling widens the opportunities available to all sections of society and provides a number of opportunities to tackle social exclusion and improve the public realm. In particular it offers:

- Low cost private transport - Around a quarter of households in the HIE area do not have access to a car, as shown below, and cycling can offer a lower cost alternative to car travel. This proportion increases for the major towns and settlements, varying from 25% in Tobermory to 46% in Campbeltown as examples from the Argyll and Bute area. Further details are provided in Appendix E.

***Table 3: Car / van availability***

| Area | Proportion of households with no car or van |
|---|---|
| HIE Area | 25% |
| | |
| Highland | 25% |
| Moray | 24% |
| Argyll & Bute | 28% |
| Orkney Islands | 22% |
| Shetland Islands | 23% |
| Western Isles | 30% |

Source: Census, 2001

- Access to public transport – in rural areas bus and rail service coverage is necessarily more sparse than in densely populated areas. Cycling can be used to access other faster modes of transport.
- Access to employment, shops, health, friends and social networks – the role of cycling has been recognised in social inclusion policy for many years from “get on your bike” to “delivering the connections” (SEU 2003).
- Independent mobility for children – cycling helps to deliver increased confidence and improved self-esteem.
- Improved perception of security as it increases the number of people on the streets and improves the vitality of the local environment
- An inclusive social activity which can foster personal and community development for all people in society (Scottish Executive 2001).

2.25 Cycle investment as part of a broader approach to the planning of land uses and development can also deliver benefits from reducing the land devoted to car parking - dependent upon location, one parking space can cost as much as £1,000 per year to an employer, in construction, maintenance, management and lost rental revenue (TransportEnergy Best Practice, 2000), although for most of the HIE area the cost will only be a fraction of this. Car parking space is one of the main uses of land within city areas. On-street parking can reduce traffic capacity and increase potential congestion as it utilises the equivalent of one lane of the road. Any estimates of the value "released" from a reduction in congestion, parking requirements, environmental benefits would need to be made on a site-specific basis with appropriate traffic demand information.

# 3.0 Review of Data for the Highlands and Islands

3.1 There are many ways in which cycling benefits the Highlands and Islands. Data and information on these has been sourced through interviews with interested bodies, data supplied by the Forum members, and other information sourced by the research team. It has therefore been necessary to rely largely on secondary data sources with only limited validation of these based on wider knowledge and experience.

3.2 In Chapter 2, four main categories were used to discuss the main benefits of cycling. To allow direct comparisons between the theoretical benefits of what should be achievable and the actual benefits that have been identified locally, the same categories have been used covering transport, health, tourism and other economic, environmental and social benefits.

### *Transport*

3.3 An example of the relatively high "base" for cycling in the HIE area is that current cycling levels (2001 census) in Moray Council areas for travel to work or study are highest of all Scottish Council areas. There are also relatively high levels for the Highlands and Orkney, as shown in Table 4. Many wards within the HIE area show significantly higher levels of utility cycling, including some in Inverness, Nairn, Forres and other locations in Moray Firth area. A selection of these are listed in Appendix E.

***Table 4: Levels of Cycling to Work or Study***

| | Percentage of people aged 16-74 in employment or studying who travel to place of work or study by bicycle |
|---|---|
| SCOTLAND | 1.44 |
| Argyll & Bute | 1.37 |
| Western Isles | 0.87 |
| Highland | 2.88 |
| Moray | 4.99 |
| Orkney Islands | 2.28 |
| Shetland Islands | 0.43 |

Source: Census, 2001

3.4 Across Scotland over half of all journeys made are 3km or less and in remote small towns, 35% of journeys are less than 1km. The 2001 census indicated that 45% of all HIE area employees live within 2km of their regular workplace, with 60% within 5km. (Scottish Executive, 2002b, 2002d, SCROL, 2003)

3.5 Men are more likely than women to cycle both as a means of transport and to keep fit. 16-19 year olds are more likely to cycle on one or more

days a week. Above the age of 60, cycling levels for both exercise and as a means of transport decrease. (Scottish Executive, 2002d)

3.6 However the reasons for the higher than average cycle levels in the Highlands and Islands cannot be explained by geographic and demographic factors alone. For example cycling levels for travel to work in remote small towns are above Scottish national average. Cycle levels are as much a function of cultural, attitudinal, and local factors as national trends.

3.7 Public transport relies on cycle access for some trips. A summary of available data by mode is shown in ***Table 5***.

***Table 5: Links between PT and Cycling***

| | |
|---|---|
| *Ferries* | 30,000 cycles were carried on a total of 19 CalMac ferry services for the financial year ending March 2003. Anecdotal evidence from CalMac suggests that there may be the same number again that are carried but not recorded, for example using Hopscotch tickets. This can be put in context of ca. 5 million passenger journeys on all ferries. Five ferries do not charge for carriage of cycles. On those that do, typical fare levels are £2.00, in addition to individual passenger fares. (THC, 2003)<br><br>Many ferry services are vital in making links to / between more remote areas which are attractive to cycling. The Corran ferry for example, free to cyclists and pedestrians, is a link to cycle-friendly routes on the south-west coast of the Highland region.<br><br>The Cromarty - Nigg ferry is a key link on National Cycle Network Route 1 to John O'Groats and carries an average of just under 4 cycles per day in the summer months. Revenue from this ferry is estimated at just less than for £1000 for those with cycles, compared to £22590 from car drivers. (THC, 2003)<br><br>Other non-CalMac ferry operators benefit from cycling usage and on the whole are positive towards cycle carriage. Examples include ferries between Glenelg and Skye and between Oban and Kerrera, as well as those linking Orkney and Shetland with the mainland (and destinations such as Norway) and the inter-island services. Cycle carriage information was not readily available from the operators for these services. |
| *Rail* | The rail lines in the Highland region require cycle reservations. These are estimated by Scotrail for the year 2002/2003 to be:<br>• West Highland Line 2470<br>• North Highland Line (Far North including Kyle line) 1131<br>• Inverness – Aberdeen 1755<br>• Highland Main Line – Edinburgh/ Glasgow – Inverness 3497<br>In addition, a significant number of cycles are carried without reservations being made, a requirement for these routes. In addition, in 2002, some 350 bikes were carried on the Wick-Inverness bike van, arranged for transport of bike after "end to end" rides to John O'Groats. Although bicycle carriage is free, these numbers represent a substantial proportion of overall passenger numbers. (Roberts, 2003)<br><br>This level of cycle carriage compares with approximate total passenger figures for the year 2002/03 lines within the Highlands: |

| | |
|---|---|
| | • West Highland Line 100k<br>• North Highland (Far North including Kyle) Line – 165k<br>• Inverness – Aberdeen 350k<br><br>These figures include Highland Railcards and tourist passes (Source ScotRail CAPRI data, 2002 & 2003, HIE)<br><br>Rail operators are aware of the growing demand from cyclists and the opportunity this presents in terms of cycle based tourism. Cyclists are increasingly seen as an important source of revenue and not an inconvenience to accommodate. Extensive development of rolling stock to enable bicycle carriage, through the Scottish Cycle Challenge Initiative, has been undertaken in recent years. (Roach, 2003) |
| Bus | Bus company representatives indicate that drivers often carry bikes in the luggage holds of buses and coaches but there are no records of numbers or routes. Boxed cycles represent less of a problem. On the Western Isles, bike carriage is a condition of subsidy contracts placed by the council. |
| Air | Easyjet will take boxed bikes, but there are greater problems on regional services where luggage space is limited. Bike access to airports is not always very good. |

### *Health*

3.8 The available data do not identify separately the contribution which cycling currently makes to the health of the population and therefore its current value. Perhaps the best way to assess the contribution of the current environment, lifestyle etc. to health is to identify the sensitivity to change which can make health better or worse. This then gives the best indication possible of the scale of the value of cycling in health terms.

3.9 Based on the review in Appendix A of the costs of coronary heart disease and heart failure to the Highlands and Islands it is estimated that annual savings of around £10 million per annum could be achieved from the take up of moderate activity by sedentary people. Cycling could contribute to this increase in activity. It could be particularly effective if incorporated into daily routine, which is seen as the most effective way of getting target groups to attain desired activity levels.

3.10 Data on other illnesses (e.g. late-onset diabetes, strokes, colon cancer) is less extensively researched but data in Appendix A indicate that further savings of at least £5 million in health costs should be achievable in the Highlands and Islands through an increase in levels of exercise including through cycling.

3.11 The potential for future benefits is not a good guide to current value but it is clear from the above that levels of cycle use contribute substantial value. Whilst the current value cannot easily be assessed the value of investment could be around £15million.

## *Tourism Benefits*

3.12 Several studies have set out the expenditure and multiplier effects from cyclist revenue (Westbrook, 1996, Lumsdon, 1996, Scott, 1996) which give an indication of the levels which can be expected from cycle tourists. These indicate expenditure of around £5-7 per day for day cyclists and £30 for those on main activity cycling holidays. Another survey of the Peak District National Park indicated that much of the spend was directed into local facilities, rather than purchases made elsewhere and brought in by car (Lumsdon, 1996).

3.13 The benefits and importance of tourism to the Highland and Islands area are very significant as indicated in Table 6, and several studies have investigated and quantified the investment. Recent surveys by HIE, suggest that cycling visitors to the Highlands and Islands spend £5 - £6 less per day than the average for all visitors, with cycle tourist expenditure ranging from £23 per day in the Western Isles to £33 per day in Highlands and £38 per day in Argyll and Bute. One of the reasons for this is the greater use by cyclists of accommodation at the cheaper end of the market. It may also be attributed to the fact that cyclists do not have fuel expenditure, unlike car-borne visitors. There is a lower use of hotels and more of camping and hostels in more rural areas which tend to be lower cost. However, the average length of stay of cycling holidaymakers is 2-3 days *longer* than the visitor average (HIE, undated), and stays will tend towards locally owned accommodation where leakage of expenditure from the local economy is reduced. Their expenditure is around £10 more per trip than the average visitor. Other details are summarised in Table 7.

***Table 6: Proportion of Trips involving Cycling***

| Area Tourist Board | Cycling as MAIN PURPOSE of Holiday trip (%) | Cycling as PART of Holiday trip (%) |
|---|---|---|
| Ayrshire & Arran | 22 | 12 |
| HOST | 13 | 17 |
| Shetland | - | - |
| Western Isles | 17 | 3 |
| Orkney | - | - |

(Visit Scotland, 2002.)

***Table 7: Characteristics of Cycling Trips in Scotland, 2001 UK Residents expenditure only***

| 2001 | Number of trips | Average stay (Bednights) | Expenditure | Expenditure per trip |
|---|---|---|---|---|
| Cycling as Main purpose | 100000 | 3 | £8 Million | £80 |
| Cycling as part of Trip | 700000 | 5 | £147 Million | £210 |
| All trips | 17.5 Million | 3.5 | £3456 Million | £199 |

(VisitScotland, 2003, Scotexchange.net, 2003)

3.14 The socio-economic profile of cyclist visitors is similar to that of the visitor average (HIE, undated), except for dedicated holiday cyclists who tend to be in the "AB" social grouping.

3.15 The main findings of a study on the economic value of cycling to the former Highland Region (Westbrook,1996) are worth revisiting since they include not just cycle tourism by UK residents but all visitors and the relative, if not absolute levels, for each group of visitor are likely to be an indication of current patterns.

- Holiday cyclists generate £4.5m of which overseas tourists generate £1m.
- Cycling day trips by people living locally generate £830,000.
- Tourism and leisure day trips generate £9.8m direct expenditure and £14.7m including multiplier effects.

3.16 If these proportions still apply today then the total economic value to the HOST[3] area of cycle tourism would be around £35 million per annum. Crude estimates of around £3 million for Arran and £15 million for the Argyll and Isles area[4] can be made based on trip numbers. Figures for the Island tourist boards are not available, but an overall estimate of around £60 million can be made on the economic value of cycling in the HIE area. Estimates for Scotland as whole and other more detailed issues relating to cycle tourism are discussed in Appendix B.

[3] Highlands of Scotland Tourist Board
[4] Part of the AILLST (Argyll, the Isles, Loch Lomond, Stirling & the Trossachs) Area

# 4.0 Estimates of Total Value and Return on Investment

## *Estimating Total Value*

4.1 Building on the findings of Chapters 2 and 3 the overall value of cycling to the Highland and Islands can be estimated in very broad terms using the same categories as before: transport, health, tourism and other economic development, environmental and social factors.

Transport

4.2 Most transport appraisal uses values of time, which have been researched for the UK by DfT, and agreed with the Treasury as appropriate for transport appraisal. These values are updated periodically and published for all modes including cycling for both work and non work trips (DfT 2001). In practice there is usually insufficient data on walking and cycling activity to put an overall value on travel by these modes in scheme appraisal. However an estimate can be made for the Highlands and Islands based on total population and cycling travel time per person. The distribution of this value van also be apportioned to each part of the area based on the data in Chapter 3.

4.3 The value of transport used in the appraisal is the total travel time and operating costs of all the measured vehicles. However the recently issued Scottish Transport Appraisal Guidance recognises that there are both strengths and weaknesses in this sort of approach. Although average values of time include many social costs it is not always helpful to use aggregate values such as this to assess locally specific issues. Appraisal therefore requires a mix of qualitative and quantitative indicators to ensure good decision making. Nevertheless for the purposes of putting a number on the transport based value of cycling, which is equivalent to the sort of numbers often used to quantify other transport markets, the aggregate approach is the best available.

4.4 Table 8 summarises the value of time based estimate. The equivalent value for car travel would be more than 10 times the cycle value in Table 8. However the importance of this type of analysis is less important as an indicator of absolute values than as an indication that achieving significant increases in cycling levels would have significant value. As noted above aggregate values of time are often not helpful in transport planning. Good decision making relies on understanding how the affected group values the change, and targeted improvements are much more successful than generalised approaches.

4.5 The utility of the analysis in Table 8 is that it shows that the scope for generated cycle travel (e.g. a doubling of cycling in line with the national target) has a very significant aggregate value and that strongly positive net present values could be expected from well planned cycle investment programmes.

***Table 8: Value of Cycle Travel Time***

| | £ |
|---|---|
| Approximate population of HIE area (census 2001) | 401,000 |
| Average minutes travelled by cycle per person per year (Scottish Transport Statistics – personal travel) | 396 |
| Non work value per minute (note a few of the minutes travelled by cycle will in fact be on business but for the purposes of this estimate it is assumed that all cycle use is travel to work, leisure, personal business, etc) (DfT 2001) | 6.23 |
| Total value per annum | £9.89 million |

4.6 When appraising motorised travel, operating costs are also included comprising fuel and non fuel elements. These are more difficult to quantify for cycling and are much smaller so can be ignored here.

4.7 It can be difficult to avoid double counting of travel time based values with other ways of estimating the value of cycling since the 6.23 pence per minute includes an estimate of social costs. Although the health tourism and other issues below relate mainly to social and economic factors which are additional there may be some limited overlap with the social costs in Table 8.

Health

4.8 In Chapter 3 it was estimated that the health benefits of greater exercise could be around £10-15 million and that cycling could play a significant role in facilitating this. In addition to this there are many other unquantifiable health benefits including psychological impacts.

4.9 Against this there are current casualty costs for cyclists. Based on an average value per road casualty for cyclists £35,350 (DfT 2001a) and a pro-rata calculation for the value of cycle casualties in the HIE area (Scottish Executive (2002a) the cost of cycle casualties is £2.35 million. As discussed in Appendix A, the cost of casualties and risks of cycling are complex issues. If levels of cycling rise then the costs per cyclist are likely to fall. Therefore as the amount of cycling rises the health benefits increase and the costs fall.

4.10 As identified in Appendix A this has led some researchers to suggest that the ratio of health benefits to costs could be as high as 20 to 1. However in the Highlands and Islands area where the secondary benefits such air quality impacts are lower the ratio will be very much lower.

4.11 For the purposes of this overall assessment it is probably sufficient to assume that the health benefits outweigh the costs and that the differential will grow with greater success. To maximize the early gains action on road safety improvements should be a priority.

Tourism

4.12 Chapter 3 suggests that the economic value of cycle tourism in the HIE area is around £60 million. If cycling were not possible, tourists would perhaps use other modes or still make trips to the area for other purposes. Without more detailed research on this, the proportion which can be allocated to cycling is therefore uncertain. However this is no different from any other component of the tourism product. Provided that it is recognized that the tourist value is part of a package which makes the HIE area attractive to visit, the added value to the economy from cycling is clearly substantial. As a minimum, the trips where cycling is the main purpose could be considered with a total value of £8million. Therefore overall the value of cycle tourism will significantly exceed £8million and could be up to £60 million.

4.13 To establish one single figure for tourism benefits (for the purpose of comparison with others), a pessimistic estimate can be made by summing 60% of the lower figure of the range above and 40% of the higher figure, giving in this case £30 million, when rounded.

Other economic, social and environmental factors

4.14 Although other factors cannot be quantified this should not be taken to mean they are negligible. Indeed the other factors may provide benefits in excess of those identified above. The value of enhanced community capacity in building sustainable communities, of the land value created by less need for parking spaces, or of improving the quality and attractiveness of the local environment, or of a happy workforce for a successful business, may not be measurable but they are essential for the future success of the economy. This study follows the approach recommended by SACTRA in their 1999 report on transport and the economic and considers the direction of change and the consistency with policy aims, rather than the approaches they described as poor practice where in the absence of adequate data unjustified quantitative estimates were made.

4.15 Table 9 summarises the total value of cycling based on the above analysis

***Table 9: The Value of Cycling in the HIE Area***

| Element | Estimated Total Current Value | Investment |
|---|---|---|
| Transport | £9 million | Doubling cycling in line with national target equivalent to £4.5 million[5] |
| Health | Substantial but unquantifiable | Benefits of £10 - 15 million could be achieved |
| Tourism | £30 million | Future investment should be able to cover its costs to maintain or increase this. |
| Other | Large and unquantifiable | Well planned investment should provide significant value. |
| Total value per annum | Estimated at over £20 million and less than £100 million | Benefits worth more than £20 million should be possible |

### *Investment in Cycling*

4.16 A key policy goal is therefore to capture more of this value through initiatives for cyclists. To ensure that interventions tackle issues broadly, joint working between many public and private agencies will be needed. This should also secure as many of the potential benefits as possible.

4.17 Initiatives such as safer routes to school and business travel plans have shown what can be achieved (Scottish Executive, 2001a). By systematically identifying the interests which each partner has in improving cycling, solutions can be identified and delivered which are both fundable and effective.

4.18 Key benefits by sector include:

- Transport – Modal shift, road safety, local accessibility, integration between modes.
- Health – Physical activity, developing personal independence, obesity, community and workplace initiatives.
- Tourism – Activity holidays, forest cycling, developing tourist businesses
- Other economic, social and environmental – Land use planning for attractive town centers, development of small businesses, improving the distribution of economic activity.

4.19 Table 10 suggests some priority initiatives which should optimise the ability to capture the value of cycling in each of the types of local area. However the benefits from any initiative are context specific. It is not helpful to present unverifiable assessments using statistics such as “A

[5] Using the rule of a half travel time on generated trips is taken as half the amount of generated time.

well planned safer routes to school programme can achieve cost benefit ratios of ….”

4.20 It is however important to highlight that there are large potential benefits for all types of area in the Highlands and Islands area and that local schemes which build commitment from local people and which can be appreciated by visitors will be successful in delivering these benefits.

4.21 Table 10 should therefore be a guide to the type of scheme which is likely to deliver the greatest value locally by type of area.

***Table 10: Priority Programmes to Capture the Value of Cycling***

| Location | Measures |
|---|---|
| Regional Centres<br>Approx Total Population 119k<br>e.g. Inverness, Stornoway, Kirkwall, Lerwick | • Increasing utility cycling through local routes and facilities<br>• Traffic calming / management, town centre management,<br>• School and workplace travel plans<br>• Health and general cycle promotion.<br>• Links to local leisure routes and long-distance routes<br>• Local off-road / specialist facilities<br>• Specialist cycle sales/ manufacture / repair |
| Sub-regional centres<br>Approx Total Population 118k<br>e.g. Thurso, Fort William, Elgin, Oban | • Increasing utility cycling through local routes and facilities<br>• School and workplace travel plans and travel plan networks<br>• Health and general cycle promotion.<br>• Links to local leisure routes and long-distance routes.<br>• Local off-road / specialist facilities<br>• Cycle sales/ repair |
| Local Centres<br>Approx Total Population 54k<br>e.g. Grantown on Spey, Mallaig, Tobermory, Dufftown | • Appropriate local links and routes<br>• School travel plans<br>• Health and general cycle promotion.<br>• Links to local leisure routes and long-distance routes |
| Rural Areas<br>Approx Total Population 110k | • Safe facilities on/by trunk roads<br>• Traffic calming / quiet lanes approaches especially where high tourist traffic<br>• Off-road / forest cycling facilities & business opportunities |

4.22 Delivering each type of scheme will require sensitive management and a recognition of what benefits can be achieved in the short and longer terms. The right mix of training, information, links with other modes, joint working and other practical elements will be needed.

4.23 Ultimately success will depend upon correctly identifying user needs and tackling them in ways that can gain acceptance from the target group. It is not practical to assume that non cyclists can suddenly become experienced cyclists. Building ownership of cycle based solutions takes time and needs to be supported with practical information and training to ensure the theoretical value is realised in practice.

4.24 In this respect the stated aims for the proposed national agency for Scotland's Transport should be helpful to focus on delivery for users which is democratically accountable and facilitates joint working at all levels. Integration across policy sectors is easiest to achieve at a community level but to capture the value of cycling in project delivery at this level will require future funding and administrative frameworks to be more conducive to joint working than they have been in the past.

# 5. Conclusions

5.1 The benefits of cycling are very broad. Although cycling is rarely the most important issue for any public body or business in the transport, health, tourism, economic development, environmental, education or other sectors, it is the broad contribution that cycling makes within all these sectors that defines its importance.

5.2 Joint working to deliver cycling improvements has been frustrated in the past by sectoral accountabilities, but this has now been recognised by government and active steps are being taken to overcome this, including the introduction of a new project appraisal framework by the Treasury. This is being rolled out in all areas of public policy and allows many cycling initiatives to be viewed in a fresh light.

5.3 The main quantifiable benefits from cycling fall within the transport, health, and tourism sectors. Data from these sectors from across the HIE area indicate that cycling is currently worth between £20 million and £100 million p.a. to the economy and that this could grow by well over £20million with well planned investment. It should also be recognised that investment will be needed to maintain this value particularly in highly competitive tourism markets.

5.4 There is substantial scope to bring forward investment programmes under the themes in Table 10 to increase this already important sector. This review suggests that the economic returns that can be expected from detailed projects and programmes will be excellent based on the range of cross sectoral benefits achieved.

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# Appendix A
# Health and Cycling

## *Introduction*

The Scottish population is becoming increasingly sedentary. In recent years, the increase in the use of the motor car as the primary mode of transport, particularly in rural areas, has seen the use of cycling (or walking) for journeys to work, school or for shopping diminish greatly. These trends have been matched by an increase in the health burden of the population as the health service has to cope with the increase in illnesses associated with sedentary behaviour.

An increase in the use of cycles for transport and recreation to promote health is well established and accepted as a route for enhancing the well being of the population and reducing the load on the health service. There have been mixed responses to these promotions, as there has been some criticism that an increase in cycling will result in an increase in the number of road accidents, and this will outweigh any benefits gained from an increase in health. This attitude has been summarised as "if you live long enough, you'll live longer" (Roberts et al, 1996)

However, medical and social research has shown that for any increase in the use of bicycles, the benefits hugely outweigh any costs, and that cycling is an activity that should be promoted as part of a healthy lifestyle.

This section of the report will review relevant literature to outline, and attempt to quantify, the full range of health benefits associated with cycling – including both psychological and physiological benefits. These will then be contrasted with findings on the costs and risks of cycling.

## *Health Benefits of an Active Lifestyle*

The health benefits of cycling predominantly arise as a result of reducing the sedentary behaviour of the individual. The physical health risks associated with this lifestyle shall be outlined first, followed by a discussion as to why cycling is a particularly effective method of exercise based healthy activity. This will be followed by a discussion of the ways in which cycling can help with the mental health of individuals.

Cycling has been proven to be an effective method of maintaining a healthy lifestyle. It has been suggested that the fitness level of those that regularly cycle is "equivalent to being ten years younger than their chronological age" (BMA, 1992). Statistics such as this are general, but there has been a substantial amount of research that defines the ways in which cycling, as an element of an active lifestyle, can prevent a large range of diseases.

People who live a sedentary lifestyle are at risk from a range of diseases, including: coronary heart disease (CHD); stroke; diabetes (late onset); and obesity and related diseases. In addition, those who regularly exercise reduce

their total blood cholesterol and blood pressure. There is also significant evidence that an active lifestyle can improve mental well-being and self esteem, with inactive people being more likely to suffer from depression.

### *But does cycling really help?*

Regular physical activity has been proven to assist, to varying degrees with the health-related issues described above, but to what extent does regular cycling itself contribute to physical and mental health?

In general, different types of physical activity can give different levels of benefit, yet research has suggested cycling can be amongst the best ways to be active. "Physical activities that are the most health promoting are moderate habitual and not seasonal…the only activities that meet these requirements and are maintained throughout life are walking, gardening and cycling" (Roberts et al, 1996).

Surveys of those using National Cycle Network showed that nearly 8 out of 10 cyclists said that the NCN routes had helped increase their levels of physical activity. Of new cyclists and those returning to cycling, 61% said their physical activity levels had increased by a large amount.

Research in Scotland shows there is a very high awareness of the health benefits of cycling, even amongst non-cyclists. (Scottish Executive, 2002d)

### *Physiological Health*

A significant amount of research has been undertaken directly studying the effects of cycling on health, and this has produced some clear evidence of the benefits of *'getting on your bike'.* One of the most significant studies into the long term health effects of cycling was undertaken in Denmark over a period of 14.5 years (Andersen et. al., 2000). The study involved 30,000 people, and accounted for a range of factors including age, health status and socio-economic criteria. It was found that even after adjusting for risk factors including physical leisure activities, those that did not cycle to work experienced a 39% higher mortality rate than those who did. In addition, it was suggested that older people may benefit more than younger people.

These powerful findings echo older work by such as (Hendricksen, 1996) whose study found that cycling as part of normal daily activity (e.g. three kilometres per day) can produce cardio-vascular fitness gains equivalent to formal fitness training programmes. Finnish research (Oja et. al., 1991) found that cycling to work improved fitness and health, even when compared to walking. The subjects were found to have increased aerobic fitness, decreased cardio-vascular load in submaximal standard work and increased use of fats as an energy source. A UK study has found increase in fitness, fat loss and leg strength as a result of non-exercisers starting to cycle four times a week (DETR, 1999). Morris et al (1990) found results that suggested regular cycling could reduce the chance of suffering fatal chronic heart

disease by a half in those cycling to work, and Australian research has shown that in the treatment of people with high blood pressure, cycling can be as effective as conventional drug treatments (Roberts et al, 1996). Physical activity is associated with reduced cancer incidence, particularly of the colon, although there are indications of protective effects with other forms of cancer.

Other research has indicated that cycling and regular exercise can give benefits such as a reduction in 'bad' cholesterol, heart attacks and strokes; reduce obesity (Roberts et al, 1996); improve mobility, co-ordination, balance and functional capacity (SNAP, 1996) and as a non-load bearing exercise assist in the prevention of osteoporosis (Bloomfield et al, 1993).

A concern for cyclists wishing to commute often stems from the level of pollution in built up areas, yet a key study (Van Wijen et. al, 1995) has found that motorists are subject to worse pollution levels than cyclists. Despite breathing two to three times as much air as the motorist due to physical exertion, the cyclists were found to have breathed 60% less carbon monoxide as drivers, and significantly lower levels of other pollutants.

### *Psychological Benefits*

Research into the psychological benefits of cycling is less extensive, yet provides substantial evidence of the benefits of cycling for mental well being. The generic benefits of exercise have been outlined above, yet some cycling specific research has been undertaken. Fitzsimmons and Buettner (2000) undertook a clinical trial prescribing cycling four times a day to sufferers of depression. Results were accepted at a 'highly significant level' that those that had undertaken the cycling had lower levels of depression.

Mytanwy (2001) indicates that the nature of the cycling action may be doubly beneficial to cyclists' mental health. Cycling combines the benefits of aerobic exercise as a result of leg movement, with the anaerobic 'pulling and tugging of the handlebars'. Research in the field of weightlifting has suggested that this latter form of exercise can have anti-depression effects. In addition, Mytanwy suggests that the fact that cycling is normally undertaken in natural light may also have positive effects, particularly in relation to those that suffer seasonally affected disorder (SAD).

### *How much cycling is enough?*

The research above presents a strong case suggests that cycling can be beneficial for health, but it how much cycling needs to be done for health gains to be significant?

As Roberts et al (1996) point out "the 'no pain – no gain' mentality [often associated with exercise] has a negative public health image" by suggesting that the only way to get benefits from exercise is to work at a high intensity for long periods. This attitude understandably acts as a barrier to those who may wish to cycle as a health benefit.

However, much of the research outlined above has indicated that the use of cycling for small journeys at a low intensity can bring substantial health benefits. Indeed, a HEBS/University of Glasgow guide indicated that “30 minutes of cycling on most days of the week” has the potential to grant "huge health benefits", and Sustrans (2002a) indicate that “cycling just three kilometres, four days a week is enough to improve physical performance”.

The current recommended level of activity for adults is “30 minutes of moderate activity, 5 days a week” (SHS, 1998). Data from the Scottish Health Survey indicates that in the Highlands and Islands approximately 60% of adult men and 70% of adult women *fail* to meet this activity level (SHS, 1998). Given that this level of activity could be met by a 15 minutes cycle to work, school, shops etc. and back each day, the benefits of promoting cycling for the health of those in the area are substantial.

***What about the risks of cycling?***

Allied to any of the benefits described above, as a method of exercise cycling does carry some risks associated with injuries and accidents. These will be outlined below, followed by a indication of comparing risks against the benefits that can be gained.

In terms of direct injuries, cycling could be considered to be a low risk activity. The most common injuries are related to knee problems, but these are mostly associated with sporting and endurance cyclists (Cavill and Davis, 2003). There are also research findings relating to nerve problems in the wrists and the problems of ‘saddle soreness’ but again these can be classified as minor risks, particularly for non-competitive cyclists.

The major risks associated with cycling are a result of accidents that occur whilst cycling. The main focus of this concern by health professionals has been upon road traffic casualties, and it is as a result of the real and perceived dangers posed by motor traffic that it is acknowledged as one of the main barriers to engaging in cycling (CTC, 1997).

Calculating these risks is unfortunately hugely problematic. Statistics are available (e.g. DfT, 2001, HHB, 2003) that can provide information on the number of incidents, but these are only a result of accidents reported to the police, or hospital admissions. It can be expected that this will be a substantial underreporting of the real figures, and therefore any conclusions drawn must be treated with some caution (Cahill and Davis, 2003). In addition, figures that simply show number of accidents or admissions to hospital, do not take into account the frequency of accident when compared to number of journeys taken, or distance travelled.

Research that has attempted to investigate the level of risk in cycling has provided some interesting results. When compared to other modes of transport one study has indicated that it bears a lower risk than walking (with a

very low actual risk – one death per 33million kilometres of cycling) (Wardlaw, 2002), but that car travel could be viewed as a lower risk per distance travelled. A Dutch study (MoT, 1999) which excluded data from motorway journeys (where cycling is prohibited in the UK) found that the chances of being admitted to hospital after a crash was approximately equal for motorists and cyclists.

An alternative perspective is that the risks that cyclist present to other road users, is of course minimal, therefore an increase in cycling could be seen as reducing the overall transport risk.

In summary, although the risks to those cycling are difficult to quantify, the benefits are considerable. As Roberts et al (1996) note - "cycling is widely perceived to be an unsafe activity but very few people consider the consequences of their sedentary lifestyle on health". Assessing how to compare these benefits and risks is difficult, and any cycling promotion should include taking steps to make cycling a more safe activity.

Yet it is acknowledged that even in the current 'hostile cycling environment' in the UK, the benefits of cycling are likely to outweigh the risks. Indeed, one piece of research has even suggested that the benefits outweigh the "loss of life years in cycling by a factor of around 20 to 1" (BMA, 1992).

***Costing health benefits***

Litman (1999a) bases a health argument for walking and cycling on the medical evidence that 30 minutes active exercise per day increased life expectancy by 1.5%. (This can be alternatively expressed as a percentage reduction in the risk of death at older ages.) At UK's value of statistical life of £1.145m (DfT, 2000) and average Scottish life expectancy of 75.5 (Scottish Executive, 2003) this equates to £17,000 for 595242 extra lifetime minutes of cycling or 3p /minute. Assuming that cycling averages 20 km/h, one kilometre is equivalent to 3 minutes of exercise or 9 p/km.

A more comprehensive analysis of the health benefits of cycling has been made by Roberts *et al* (1996). The authors estimate a saving of 0.00085 deaths per cyclist-year from adequate exercise taken by cycling 6 hours per week. A crude valuation using £1.145m per statistical life gives 5 p/ minute.

One piece of research in Northern Ireland (population 1.7million) which considered reducing the sedentary population from 20% to 15% indicated that the "potential savings in life years lost due to physical inactivity, and reduced hospital admissions and treatment costs indicate that it may be worth spending £2.35 million a year on promotion to achieve the increase in activity" (Sustrans, 2002a). Applying this to the population of Highlands and Islands indicates a figure of £0.6 million.

### *Case Study: Costs of Coronary Heart Disease and Heart Failure*

Coronary Heart Disease (CHD) is one of the leading causes of death in Scotland - (11,692 deaths in 2002). Scotland has one of the highest death rates from CHD in the world, attributed to high rates of smoking, poor diet, physical inactivity and poverty. In the year ending March 31 2003 NHS Scotland, CHD discharges represented around 4.6% of all hospital discharges. The age-standardised mortality figures shows Scottish mortality rates are the highest in the EU and are close to those of Eastern Europe.

In addition to the human costs, CHD cost the health care system in the UK just under £1,750 million in 1999. Less than 1% of such costs were spent on the primary prevention of CHD.

Looking only at the direct costs of CHD to the health care system grossly underestimates the total cost of CHD. Production losses from death and illness in those of working age and from the informal care of people with the disease contribute greatly to the overall financial burden. Of the total cost of CHD to the UK, 25% was due to direct health care costs, 41% to productivity losses, and 34% to the informal care of people with CHD.

***Table 11: CHD Costs in Scotland and Highland and Islands***

| £ million | % of total cost | Scotland | H&I |
|---|---|---|---|
| Direct health care costs | 25 | 149.0 | 13.4 |
| Productivity loss due to mortality | 10 | 60.4 | 5.4 |
| Productivity loss due to morbidity | 31 | 190.1 | 17.1 |
| Informal care costs | 34 | 208.1 | 18.7 |
| **Total** | | 607.6 | 54.6 |

Source: Adapted from Liu et al, 2002

In summary CHD is estimated to cost the UK economy a total of £7,055 million a year. (BHF, 2003) This represents a cost which is higher than that for any other single disease for which a comparable analysis has been carried out. In a simple reduction by population, the costs to the Highland & Islands Region[6] of CHD can be estimated at around £55 Million per year.

*Heart Failure*

Poor health does not only have impacts on acute medical care; there are substantial implications for general practice and primary care. Data from the 4th National Study of Morbidity in General Practice, show that the number of GP consultations in patients with heart failure ranges from around 11 per year in patients aged 75 years and over, to just over 13 per year in people aged 45 to 64 years. It is estimated that in 2000 there were around 7.6 million

[6] Highland, Moray, Argyll & Bute, Orkney, Shetland, Western Isles - not including parts of Ayrshire & Arran

consultations for heart failure in the UK. Multiplying these consultations by the appropriate unit cost gives a total general practitioner cost of about £104 million. In the Highlands and Islands this equates conservatively to an annual cost of £0.8 million.

Overall, the total direct medical cost of heart failure in the UK each year is currently just over £625 million. Hospital inpatient care is the biggest single health care cost, accounting for approximately 60% of the total cost of heart failure in the UK. A simple population-based reduction equates to a cost of around £5 million in the Highlands and Islands. Estimates for other diseases are provided in Table 12.

***Table 12: Estimated Annual Cost of total costs of common diseases/ ailments in Highlands and Islands / £Millions***

| Disease | Direct health care cost | Productivity loss and/or informal care cost | Total costs |
|---|---|---|---|
| Coronary heart disease | 13 | 41 | 55 |
| Back pain | 13 | 40 | 53 |
| Rheumatoid arthritis | 7 | 8 | 16 |
| Alzheimer's disease | 15 | 0 | 15 |
| Lower respiratory tract infections | 14 | 0 | 14 |
| Stroke | 13 | 0 | 13 |
| Diabetes | 10 | 0 | 10 |
| Arthritis | 8 | 0 | 8 |
| Multiple sclerosis | 1 | 3 | 4 |
| Migraine | 0 | 3 | 3 |
| Deep vein thrombosis and pulmonary embolism | 3 | 0 | 3 |
| Depression | 3 | 0 | 3 |
| Insulin dependent diabetes | 2 | 0 | 2 |
| Critical limb ischaemia | 2 | 0 | 2 |
| Epilepsy | 2 | 0 | 2 |
| Benign prostatic hyperplasia | 1 | 0 | 1 |

Source: Adapted from Liu et al, 2002

Table 13 shows the numbers of deaths of Highland residents for circulatory diseases, of which heart disease and strokes are highlighted separately, obesity and diabetes. The overall numbers of deaths from a circulatory disease has remained relatively stable, although the numbers of strokes has increased steadily. The numbers of deaths from obesity and type 2 diabetes are small by comparison. Whilst this may seem surprising it must be remembered that people with such conditions will tend to die of complications and associated conditions rather than obesity or diabetes themselves.

***Table 13: Mortality - Numbers of deaths by cause, Highland residents.***

| | 1999/00 | 2000/01 | 2001/02 | 2002/03 |
|---|---|---|---|---|
| Diseases of the Circulatory System | 1319 | 1338 | 1304 | 1323 |
| Coronary Heart Disease | 708 | 707 | 691 | 672 |
| Cerebrovascular Disease | 374 | 420 | 413 | 433 |
| Obesity | 7 | 3 | 5 | 12 |
| Diabetes type 2 | | 55 | 56 | 68 |

Source: HHB, 2003

Preceding such a conclusive event are often years of morbidity. Table 14 shows the numbers of episodes of care in a hospital (anywhere in Scotland) for a Highland resident. This is not a count of 'individuals', but of the numbers of times that individuals are admitted to hospital, and their diagnoses included a circulatory disease, obesity, or diabetes whether that was the reason for their admission or not. Whilst the numbers of deaths have remained relatively stable, the numbers of hospital episodes has risen considerably.

***Table 14: Morbidity - Numbers of hospital episodes, Highland residents.***

| | 1999/00 | 2000/01 | 2001/02 | 2002/03 |
|---|---|---|---|---|
| Diseases of the Circulatory System | 11159 | 10739 | 14640 | 16425 |
| Coronary Heart Disease | 4425 | 4135 | 5900 | 6524 |
| Cerebrovascular Disease | 1330 | 1384 | 1512 | 1644 |
| Obesity | 363 | 277 | 462 | 510 |
| Diabetes type 2 | 1653 | 1737 | 2588 | 2974 |

Source: HHB, 2003

These increases in admissions will have significant cost implications, as the individual costs of attendance / case in the following table make clear.

***Table 15: Average cost per case/ attendance at Highland and Island healthcare providers / £***

| | Inpatients | Daycases | Outpatients | A&E |
|---|---|---|---|---|
| Highland Acute Trust | 1582 | 487 | 61 | 73 |
| Highland PCT | 3877 | 235 | 133 | 82 |
| Orkney Unit | 2334 | 608 | 57 | 144 |
| Western Isles Unit | 2537 | 743 | 101 | 72 |
| Shetland Unit | 1905 | 809 | 63 | 149 |
| Ayrshire & Arran Acute Trust | 1663 | 347 | 43 | 56 |
| Ayrshire & Arran PCT | 2718 | 329 | 24 | 65 |
| Argyll & Clyde Acute Trust | 1442 | 402 | 31 | 55 |
| Lomond & Argyll PCT | 1169 | 315 | 46 | 70 |

Adapted from Scottish Health Statistics (2003)

Lack of activity is responsible for substantial disease incidence. For example, the National Heart Forum indicates that 37% of deaths from coronary heart disease are due to a lack of activity, and that 9% of these could be avoided if sedentary people were to take up moderate activity (Sustrans, 2002a).

Using figures for costs of CHD and heart failure *only* in the Highlands and Islands, it is estimated that annual savings of **around £10Million** could be achieved from the take up of moderate activity by sedentary people. Cycling could contribute to this increase. Another study (Bicycle Association, 1995) concluded that heart disease would decline by 5-10% if one third of short trips shifted from driving to cycling. Using the lower range of this figure indicates an annual costs saving of £3 Million in the Highlands and Islands.

This estimate does not include health care costs saved through avoidance of other diseases and ailments brought on by lack of physical activity. The reduction of incidence of late-onset diabetes, strokes, colon cancer, obesity and other related diseases through healthy activity, would similarly bring significant direct (health service costs) and indirect (days lost at work ill or caring for the ill) savings for the economy. It is estimated that these total at least another **£5 million.**

# Appendix B
# Cycling and Tourism

# Introduction

This Appendix discussed a number of factors that influence the success and value of tourist cycling on Scotland covering:

- Profile of Cycling Holidaymakers
- Seasonality
- Distribution of tourism and impacts
- Off Road and Forest Cycling

## *Profile of Cycling Holidaymakers*

Visitors from England make up the greatest proportion of cycling visitors to the HIE area, followed by Scotland and then Europe. In the Western Isles and Highlands, around 30% of cycling visitors are from outside the UK, this figure dropping to 15% in Argyll and Bute.

Of the UK visitors, where cycling was the main purpose of a holiday, four fifths of visitors tend to be male. Most are aged 35 to 54 and the majority are within the higher-spending "AB" social grouping. A more balanced gender split, a wider age range and those from various social groupings will undertake cycling as part of a holiday trip.

## *Seasonality*

In 2001 80% of holiday-makers for whom cycling was the main purpose of their trip to Scotland visited between April and September. Where cycling was part of the holiday trip, 76% visited between April and September. (Visit Scotland, 2002.) Whilst all holiday trips have smoother coverage across the seasons (59% from April - September), an important seasonal aspect is the demand that dedicated enthusiast mountain bike facilities can bring outside of the peak periods. The growth of night-time mountain biking highlights the increasing all-year-round nature of this pursuit.

## *Distribution of tourism and impacts*

The Tourist Board areas within the Highlands and Islands attract varying proportion of cycling tourists, including those cycling both as a main activity and as part of a more general holiday, as shown in the table below. Many of these tourists will spend money at local facilities and where they are content to cycle on quiet signed on-road routes, the investment to increase the number of cyclists shouldn't be prohibitive. Where tourists are cycling as part of their holiday, as opposed to cycling being the main activity, income generated per trip is higher and these tourists tend to stay slightly longer as well (5 days compared to 3 days).

In the Western Isles, 10% of all visitors in 1999 were engaged in cycling or mountain biking as part of their holiday. In 2002 there were a total of 179,700 visitors with a total spend of £39.3 million (W. Isles Visitor Survey 1999, 2002)

A similar picture emerges in Argyll & Bute, where 10% of all visitors engaged in cycling or mountain biking as part of holiday in 1999. In this year there were a total of 850,000 visitor overnight stays and a total expenditure of £140 million (Argyll & Bute Visitor Survey, 1999).

Cycle tourists bring a similar level of revenue to an area as other tourists, by spending somewhat less and staying longer. Whereas car borne and bus tourists will tend to congregate (and spend money) in traditional honeypot locations, cyclists are more mobile and tend to seek quieter areas - expenditure is distributed more widely.

The HOST area attracted 13% of visitors for whom cycling was the main purpose of their holiday trip to Scotland and 17% of visitors for whom cycling forms part of the holiday trip. This places the Highlands as one of the regions where cycle tourism is most popular amongst UK resident holidaymakers. Accordingly, the HOST area benefited to a total of around £26 Million in expenditure by those on holiday where cycling was main or secondary activity. This does not include expenditure by those on day trips.

### *Off Road and Forest Cycling Centres*

Anecdotal evidence from across UK as well as Scotland, from recent developments, show that Forest Cycling is an increasingly popular activity and attracts people from the local area (Forestry Commission Scotland, 2003). Expenditure on cycles and accessories amongst this group is likely to be spent locally. Although the development of suitable way-marked tracks and facilities requires initial up-front investment, evidence from the development of Glentress indicates that this has provided good value. (Forestry Commission Scotland, 2002)

Levels of forest cycling vary considerably, but where there has been investment in the provision of both infrastructure and information, cycling levels are particularly high.

Development of mountain bike facilities in Wales as been ongoing for the last five years, based initially at Coed Y Brenin. Development of facilities here increased visitor numbers from around 14000 in 1994 to over 100000 in 1999. The average length of stay of visitors is now 2 days, with an expenditure of £40 per head per day. An estimated expenditure £5million within the local (15mile radius) economy is assigned to the facility. (Forest Enterprise Wales, undated) Importantly, much of the accommodation need for those using this facility is met at traditional seaside resorts in gradual decline, helping to overcome seasonality problems.

**Glentress**
Glentress forms one part of the 7stanes project. The plan is that by 2004 seven mountain bike centres spanning right across the heart of the Scottish Borders to Dumfries and Galloway will be created. The 7stanes centres are the Tweed Valley (including Glentress and Innerleithen), Dalbeattie, Ae, Mabie, Newcastleton, Kirroughtree and Glentrool.

Glentress is located just outside Peebles. There is a large selection of riding available for all abilities from families to enthusiasts plus The Hub café and hire / repair facilities. An approximate recreational value of £9.6 million was assigned to the site, exceeding the £3m investment in the whole 7stanes project. The figure is based on average consumer surplus of £80 per visit, related to travel time costs, bike hire and accommodation etc., with an estimated 120,000 visits annually (Moran, Tressider, McVittie, 2003).

## One-off Cycling Events

Individual events related to cycling have the potential to contribute to the local economy, and may be able to increase activity outside the main visitor periods. As an example, the Mountain Bike World Cup in Fort William, 2002 involved 2000 competitors and 8000 spectators. An estimated £516,000 of extra spending was generated in Lochaber. Amongst other benefits, 20% of those staying away from home indicated that they were combining their visit to the Mountain Bike World Cup with a longer holiday in Scotland. Additional expenditure generated outwith the local area was estimated at £59,000. A local bike shop reported in increase of 200-300% on average weekend sales for June (Taylor, 2003). This event recently won an Area Tourism Initiative award.

## Facilities Identified in Highlands and Islands

There are a range of mountain biking facilities in Forestry Commission Scotland woodlands within the HIE area, and these range from routes on existing forest roads, such as Morangie, near Tain to purpose built routes such as the World Cup cross country Witch's trail at Leanachan, and routes that use a combination of purpose built sections and forest road sections, such as the long distance Great Glen Cycle Route. Details of some current and proposed facilities are provided below. More recent routes use contour trail design, as this is a more sustainable method of design and should reduce maintenance costs.

### *Existing Forest Cycling Facilities*

Dornoch Forestry District:

- Waymarked routes: Rosehall, Morangie, Strathrory, Borgie, Camster & Truderscaig

- General access for cyclists, walkers and equestrians: waymarking and maps.

Lochaber Forest District

- Great Glen cycle route sections in Clunes (Loch Lochy side) Glen Garry and Drynachan forests. Loch Shiel side cycle route following FC & private estate road 15miles
- Leanachan Forest: 35km of trail quest easy grade cycling, 11km of Witch's trail XC moderate to expert grade, Downhill track and four cross track exists

*Potential Forest Cycling Facilities:*
These are concepts and proposals at various stages of development and do not indicate that facilities will definitely materialise. Forestry Commission Scotland will be developing an off-road cycling strategy for Scotland during 2004, which will help to identify priorities for cycling and key locations for new facilities. This will provide a structure and framework for future developments within the woodlands managed by FCS, such as the following examples of potential projects (Source: Forestry Commission Scotland District Forestry Officers)

Dornoch Forest District

- Rumster Link (Track One and Two)
- Cycle Routes in Balblair and Carbisdale Woods (at feasibility stage)
- Medium and longer distance routes around Falls of Shin (at early feasibility stage)

Lochaber Forest District

- Leanachan: Extension of routes to Witch's trail building up for 2007 World Championships
- Link route from Glen Nevis to Leanachan for better access 2004/5 (at planning stage)
- Network based on Fort William - 4 forest blocks: Glen Nevis, Glen Righ, Glen Loy, Leanachan. Links to Great Glen Cycle Route, Fort William, Oban route and existing Leanachan facilities. Potential for commercial "hub" development. (At concept / initial feasibility stage). Based on local demand and visitor demand for longer off-road routes.

Inverness Forest District

- Laggan Challenging Off Road Cycleroute (CORC) - Advanced, Intermediate and Fun Routes. "Hub" type facility. Currently awaiting planning approval.
- Aviemore area CORC
- Learnie on the Black Isle (consultation/development stage)

Fort Augustus Forest District

- Glen Urquhart: 25km of routes for walking can cycling. Link to exiting routes from Drumnadrochit.
- Strathglass: Community development of range of routes: FCS plus other landowners. Local community marketing group aiming to promote cycling events in the area. Aims for local employment and economic development. Plans for events such as Cycling Festival, Highland and Scottish XC events, Biathlon

# Appendix C
# Methods of Costing Cycle Benefits

## Introduction

This Appendix reviews three appraisal approaches which have been identified from an international review. These illustrate how appraisal practice is developing to include cross sector benefits in New Zealand, Norway, and England.

### *New Zealand*

In **New Zealand** the national funding agency (Transfund) for transport projects has developed a simplified procedure to establishing the financial benefits of new cycle infrastructure and promotion/education programmes. This enables the benefits of these projects to cyclists to be included within conventional cost-benefit approaches. Unsurprisingly, the benefit-cost ratio for cycling projects is more favourable with such an approach. These figures are set within a wider assessment framework that ensures that an investment meets identified objectives and has been set out previously in a cycle strategy. (MWH (2002), Beca Carter Hollings & Ferner Ltd (1999), Transfund, 2002))

*Health Benefits Only*

- Drawing on NZ- specific research which provided values ranging from 3 to 40 cents per km, Transfund adopted a conservative value of 10 cents per km as a provisional proxy for the *health benefits* of cycling (for new and existing cyclists - which consultation showed to be an appropriate simplification[7]). **This equates to around 4p per km in the UK.**
- A "per-cyclist" rate is also used to account for the health benefit expected from promotion, education or safety programmes. This is estimated at 30 cents per trip (based on average trip length of 3km). **This equates to around 12p per cyclist per 3km trip in the UK.**

*All Benefits*

- A composite benefit rate of $0.50/km is allocated to all cyclists using a new facility. This benefit includes elements for the general health benefits of cycling, the safety benefits of separating cyclists from the motorised traffic lane and the congestion relief and vehicle operating cost benefits that accrue from cycling. It is applied equally to new and existing users. **This equates to around 19p per cyclist per km in the UK**
- A composite rate of $1.50 has been allocated to all cyclists using a new facility that eliminates or improves a site that is an impediment to safe cycling. Examples of such projects are the provision of overbridges, underpasses, bridge-widening or junction improvements solely for cycles. This is a composite rate that contains all the elements set out above, but is irrespective of the length of the work. A rate of $1.50 has been calculated by multiplying the $0.50/km rate by the average cycle-

[7] New Zealand-specific research also recommended a value of 16.5 cents/km for new cyclists only (6p per km)

commuter trip length of 3km. It is applied equally to new and existing users for the reasons given above. **This equates to around 56p per cyclist per km in the UK**

- A composite rate of $1.50 (per cyclist) has been allocated to all new, regular commuter-cyclists (to work or educational facilities) generated by a promotional project. This rate has been calculated by multiplying the $0.50/km rate by the average cycle-commuter trip length of 3km. It can be assumed that 250 trips per year are made. **This equates to around 56p per cyclist trip (or £140 per cyclist per year) in the UK**

The health benefits of cycling in New Zealand are likely to be similar to those within Scotland, whereas other benefits related to safety and congestion relief are likely to be less suitable.

**Worked Example from Transfund New Zealand's Project Evaluation Manual: New Cycleway Facility**

Valuing health benefits for a 5 km cycleway facility:
Value of health benefits =
[5 km x 10 cents (health benefit per km) x 500 cyclists/day x 245 (working days) + [5 km x 10 cents x 200 cyclists/day x 120 (non-working days)]
= $73,250 per year

Value of health benefits for life of project = $73,250 x 10 (present worth factor for years 2 to 25 at 2% cycle traffic growth)
= $732,500

## *Norway*

Recent work in **Norway** (Sælensminde, 2002) has attempted to establish the overall costs and benefits of investment in dedicated walk/cycle routes in three settlements of different sizes, based on predicted usage rates. A summary of the costs (NoK) estimated for particular lengths of dedicated cycle /walking infrastructure is shown in Table 16.

***Table 16: Benefits of walking- and cycle tracks in 3 Norwegian Settlements***

| (NoK) | Hokksund | Hamar | Trondheim |
|---|---|---|---|
| **Benefits of walking- and cycle tracks (present value)** | | | |
| | 3.2km | 2.1km | 80km |
| Accidents (assumed no change) | 0 | 0 | 0 |
| Travel time (assumed no change) | 0 | 0 | 0 |
| Reduced insecurity for today's pedestrians | 4 191 324 | 2 711 764 | 107 638 228 |
| Reduced insecurity for today's cyclists | 9 464 281 | 6 123 338 | 398 225 323 |
| Reduced insecurity for new future pedestrians | 542 116 | 350 746 | 13 662 470 |
| Reduced insecurity for new future cyclists | 3 529 085 | 2 283 299 | 100 694 117 |
| Reduced costs for school children transport | 2 572 427 | 1 104 824 | 3 611 291 |
| Reduced costs related to less severe diseases and short time absence | 16 730 962 | 35 374 034 | 269 247 101 |
| Reduced costs related to severe diseases | 97 708 819 | 206 584 360 | 1 572 403 071 |
| Reduced external costs of motorised road transport | 9 445 569 | 19 970 631 | 124 449 172 |
| Reduced parking costs for employers | 9 484 654 | 34 553 324 | 433 356 016 |
| TOTAL BENEFIT | 153 669 236 | 309 056 320 | 3 023 286 790 |

Once capital and maintenance costs had been calculated and discounted to present values, a benefit- cost ratio was calculated. This ranged from 2.9 in Trondheim to over 14 in Hamar.

A variety of assumptions are used in developing the cost figures, such as half of new cyclists gaining health improvements due to additional cycling/ walking. Most of the benefits (60-75%) that result are related to health improvement and so assumptions in this area are particularly significant.

The net present benefit estimated from investing in 80km of dedicated cycle / walking routes in Trondheim is £252 Million , equating to £3.2million per km. Total net present costs (including maintenance over 25 years) are estimated to total £64million or £800k per km.

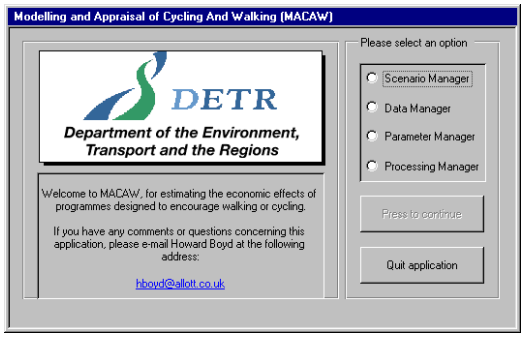
## *England*

A methodology is under development that aims to improve the appraisal of cycling and walking (Model for Assessing Cycling and Walking - MACAW). The aim for this is to establish a tool for Local Authorities to asses cost and benefits of cycling and walking projects. This project is currently 'resting', but may be developed further in the near future, primarily to improve valuation figures contained within the model. (Boyd, 2003)

**MACAW** The MACAW software models cycling and walking simply but realistically. It accepts an existing trip matrix or synthesises one from local population and land use characteristics. Modal split can be changed, manually or predicted from real world experience elsewhere. MACAW calculates the overall cost of travel for a given mix of travel modes and allows comparison of scenarios where the split has been changed to show the effect of an initiative to encourage cycling or walking.

MACAW takes the monetary values for the key costs and benefits of walk, cycle, car and public transport journeys that would be significant in a switch from car to bicycle or foot. These are road crash casualties, travel time, vehicle operating costs, (the same three as in the 'conventional' appraisal programs such as COBA), with the addition of health benefits and $CO_2$ emissions.

MACAW was designed to assess what are the economic benefits of major programmes to encourage cycling and walking. It is not so relevant to small schemes where it is not possible to predict the overall change to levels of walking and cycling trips. There may also be unexpected consequences in applying it to tourism projects, as they will probably involve significant extra car journeys as well as walk and cycle journeys, resulting in net disbenefits. MACAW does not quantify the economic benefit of extra tourism on the local service sector as, with any business generation activity, there will probably be a downside somewhere else. (Boyd et al, 2001)



# Appendix D
# Workshop For Stakeholders on 3 November 2003

# *The Value Of Cycling In Highlands and Islands Workshop Report*

This workshop involved 23 individuals from outwith the study team, representing a range of organisations on the Highland Cycle Forum and other interested parties. The workshop aimed to discuss initial findings and results of the study, generate further inputs and information sources from stakeholders and allow for further discussion of issues.

After a general discussion, separate groups discussed the value of cycling that could be secured through travel plans, off-road cycling facilities, and on-road facilities.

**General Discussion : Key Points**

Health

- Importance of investment now to reap benefits later (do nothing vs small investment now reaping long term gains).
- Absence of illness an important benefit, but economic improvements lead to poverty reduction, which leads to health benefits. Importance of skills that are associated with cycling – e.g. training, trail building, coaching, path maintenance.
- Figure would be useful for *not* doing anything in relation to health benefits. (i.e. If cycling is not encouraged, how much it will cost).
- Project such as Physical Activity Task Force and Health Promoting Schools are generating expectations which cannot be met.

Tourism

- Greater economic benefit from independent cyclists, rather than car-borne cyclists (but mobility over longer distances a problem).
- There is an untapped revenue from cyclists, can be put on small buses but contravenes regulations in some cases. Not that expensive to do it, if the will is there (e.g. trailers etc)

Travel Plans

- Importance of travel plans for businesses, gain benefits through 'selling health' as an economic benefit. SHAW important programme, and TPs can be linked to this. Must highlight both the employer and employee benefits of any travel plan.
- Would be useful to do cost-benefit analysis of health. Cost of cycle mileage in time, but health benefits arising from it. Need simple comparative terms for value, and need to get the economic value of cycling through to employees.

Infrastructure

- The relationship between transport and recreational policies in H&I. These may be going against HCF aims? For example, building new roads and worsening the conditions for cyclists. Important to put cycling and walking facilities into new infrastructure developments.
- Putting a value on creating an infrastructure for cyclists in the area is very important in helping decision-making. There is need for a figure

that can be applied to every development in H&I. Include the disbenefits for roads.

- THC needs to invest, but meeting demands and expectations will be a big challenge.
- Importance of distinguishing the different types of off road recreational cyclists, and their different needs/ requirements.

Other

- Access legislation coming in 2004 will generate cycling opportunities which will create a demand.
- Environmental quality is important and rising up the agenda - a need for sustainable lifestyles.

**Travel Plans**

Benefits:

- Financial savings in relation to parking
- Operational efficiencies (e.g. avoiding lateness / absenteeism)
- Health Benefits to individuals
- Frees up car spaces for other users.
- Put infrastructure first in new developments.
- Travel at work – is this an issue in the highlands?

Barriers:

- Health and safety concerns, accidents.
- Cycling vs. cars for work travel
- Need for pool bikes

Involving partners:

- Link to other company agendas
- Orgs and smaller offices working together, esp. in business parks

Securing Funding:

- Infrastructure – need for cycling to be a priority in the planning phase.

**Off-Road Cycling**

- Need to understand the full spectrum of 'off road' paths and to ensure that we include everything from canal towpaths and roadside routes through to specialist down-hill mountain biking trails.
- Also think of cycling as a pyramidal structure with the elite racers at the top – going down to pleasure cyclists as the large base – use in promotional thinking.
- The importance of the half day hire market for tourists not necessarily on cycling holidays – the bulk of the holiday economic income from cycling. Therefore sell cycling as part of the highland holiday package.
- Can people cycle 'off road' to work (e.g. along canals, separate paths etc.) ways of encouraging more commuter users is to get off road routes.

**Barriers:**

- No one with a specific off road cycling remit to take these issues forward (this is allied to a need for an off road strategy to be written to underpin all developments) - "need to have clear objectives and vision"
- Lots of different stakeholders, ranging from FCS through to private landowners and need to get these working together, as they cannot work outside their remit. Particularly important in e.g. access route to FCS land where developments are undertaken, as FCS cannot work outside own land to join up routes etc.
- Long term maintenance of trails is a problem.

**Promotion:**

- Establish image in Highland – "highland cycling identity". Work on a small number (not too many) of high profile 'championing' events (e.g. 2 day off road touring festivals, races/events as well as MTB World Cup) and then build on that image to encourage and improve the infrastructure for others.

**On-Road Cycling**

**Benefits**

*To individual*

- Health /feels better - Short term and long term, Improved access to local amenities especially for those without independent access to car travel - probably well over 50% H&I population, Savings by using for regular commuting etc.

*To Society*

- Increase in cycle use = increase in physical activity – potentially huge savings to health service from reduction in morbidity especially towards end of life.
- Provision of safe on road facilities has potential to enable large numbers of especially vulnerable socio economic groups more active at virtually no cost to them.
- Real modal shift could be achieved - then Savings to employers - potential for reduction in provision of car parking space
- Helps improve town centre environment.
- More productive work force (healthier).

**Barriers**

- perception of cycling as dangerous, limits on funds made available for cycling, and difficulties in raising funding. Often no alternative to unpleasant hostile routes.

**Involving partners**

- Health - Next year is Let's make Scotland more Physically Active year
- Good opportunity to engage NHS as Employer and health provider

- GPs are being encouraged to prescribe cycling- Some resistance owing to worries about liability.

**Other Points**

- Cycle parking should be provided - high quality high profile - Lead by example where possible.
- Recycling 2nd hand bikes for work opportunities,
- Securing funding - Need real shift - Policies in place - Highlands has a problem due to mixing of roads authorities in towns - LA/SE/Bear - A coherent planned ahead strategy for high quality provision is needed. Then Developer contributions can be utilised to maximum effect. Perhaps Hitrans can help to link and synergise or forthcoming Transport Scotland organisation.

# Appendix E
# Data on Selected Locations:

## Proportion of Households with no car or van

| | ALL HOUSEHOLDS | Proportion with no car or van |
|---|---|---|
| Scotland | 2192246 | 34% |
| *Highland* | | |
| Inverness | 19536 | 33% |
| Thurso | 3401 | 33% |
| Wick | 3201 | 40% |
| Fort William | 4158 | 33% |
| Dingwall | 2163 | 30% |
| Portree | 837 | 37% |
| *Argyll and Bute* | | |
| Dunoon | 4126 | 39% |
| Oban | 3489 | 37% |
| Campbeltown | 2391 | 46% |
| Rothesay | 2464 | 53% |
| Lochgilphead | 982 | 27% |
| Tobermory | 432 | 25% |
| *Moray* | | |
| Elgin | 8834 | 28% |
| Forres | 3801 | 28% |
| Buckie | 3427 | 33% |
| *Isles* | | |
| Steòrnabhagh (Stornoway) | 3519 | 36% |
| Kirkwall | 2797 | 34% |
| Lerwick | 2993 | 35% |

# Levels of Cycling to Work or Study

| Council Area | Ward Name | Percentage of people aged 16-74 in employment or studying who travel to place of work or study by bicycle |
|---|---|---|
| Moray | Finderne | 18.4 |
| Moray | Lossiemouth West | 11.75 |
| Highland | Canal (Inverness) | 9.24 |
| Highland | Nairn Cawdor | 8.9 |
| Highland | Merkinch | 8.1 |
| Moray | Forres West and Altyre | 7.93 |
| Highland | Muirtown | 7.45 |
| Moray | Elgin - Bishopmill West | 6.84 |
| Highland | Ballifeary | 6.6 |
| Moray | Elgin - Cathedral | 6.56 |
| Highland | Hilton | 6.47 |
| Moray | Forres East | 6.28 |
| Moray | Forres Central | 6.23 |
| Highland | Lochardil | 6.2 |
| Highland | Inshes | 5.99 |
| Moray | Elgin - Bishopmill East | 5.94 |
| Highland | Milton | 5.87 |
| Highland | Loch Ness East | 5.81 |
| Highland | Nairn Alltan | 5.78 |
| Orkney Islands | Lynnfield | 5.42 |
| Highland | Culduthel | 5.12 |
| Highland | Invergordon | 5.07 |
| Orkney Islands | Scapa and Kirkwall South West | 4.53 |
| Western Isles | Newton | 3.35 |
| Argyll & Bute | Bute North | 1.98 |
| Shetland Islands | North Central | 1.04 |