



# **A preliminary review of rural cycling**

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Department of the Environment, Transport and the Regions\***

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## Executive Summary

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This report examines the problems faced by cyclists on rural roads, or as they are defined on police 'STATS19' accident forms, non built-up roads. These are roads with a speed limit higher than 40 mph and are mostly outside of the main urban areas. Non built-up roads account for only 9% of all cyclist casualties, but almost one half (45%) of all cyclist deaths. The rate of fatal accidents per 100 million veh. km. on a non built-up road is almost three times that of a built-up road.

The problem for local authorities charged with reducing these accidents is that there are few clusters of accidents. They tend to be spread out over hundreds of thousands of miles of road, making spot treatment and route treatment difficult and expensive. A key to the possible reduction of rural road accidents is obtained from the finding that there is a strong probability that the severity of accidents is linked to the speed limit of the road.

In addition to the speed of traffic, rapid growth in vehicle numbers is of concern. Many urban areas in the UK have reached the point where congestion reduces the scope for traffic growth. In contrast, many countryside areas are still experiencing rapid growth. Rural roads that once provided a tranquil setting for cycling and walking are increasingly becoming used for commuter journeys and some are now experiencing congestion. This may increase the danger to cyclists and will be a disincentive, particularly for occasional and leisure cyclists.

This report also looks at the provision made for cyclists on rural roads. Local authorities are just beginning to tackle the problem of rural traffic management. Although there are many interesting ideas being discussed, few of these have been extensively implemented. It is not yet known, therefore, whether these ideas will improve road safety generally, and the safety of cyclists specifically.

Traffic management initiatives on selected routes to improve conditions for all non-motorised modes would help to improve the safety and attractiveness of cycling in the countryside. This would need to make allowance for other essential users, and the use of a rural hierarchy of roads appears to offer a potential framework on which to base this. Experience suggests that implementing this will not be easy. Some central strategic planning can be effective, but there will be a particularly strong need for local consultation right down to local parish council level.



# 1 Introduction

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This report aims to improve the safety and quality of life for those using rural roads, especially those on bicycles. To do this, the safety of rural roads and rural road junctions for cyclists has been investigated, and some possible counter-measure strategies have been examined and reviewed.

## 1.1 Background and definitions

Most research on the problems faced by cyclists has tended to concentrate on cycling in built-up areas, as this is where most people live, and where most travel occurs. Accidents are more concentrated in urban areas and often occur at 'high risk sites' where treatment can be straight-forward and cost-effective. It is more difficult to justify investments on single sites in rural areas where fewer people will benefit from them. Historically there is a tendency for transport policy to focus on urban areas.

Rural Roads Definition: For the purposes of police recording of accidents, the classification of roads into urban and rural was replaced in 1977 by built-up and non built-up roads. Built-up roads are those having a speed limit of 40 mph or less while non built-up roads have speed limits greater than 40 mph. This definition is based solely on speed limits and, although objective, takes no direct account of the nature of the area through which the road is passing.

Non built-up includes a wide range of road types. It is important to address this diversity, rather than focus on an idealised image of a typical country lane. Many journeys on 'rural' roads take place on the urban fringe. It is also important not to allow stereotypes of rural road users to appear, since the modern countryside carries a wide range of vehicle and driver types.

## 1.2 Extent of the rural roads network

In England alone there are 6,810 miles of non-built up roads on the trunk network, 15,380 miles on the primary network and 122,700 miles of minor non built-up roads. This represents around half of the total mileage of all roads.

To introduce an accident countermeasure costing just a few pounds per metre would therefore be excessively costly. The heaviest burden would also fall upon areas with the greatest lengths of rural roads, and these do not always have populations that could support a large expenditure programme. Devon has more than ten thousand miles; Lincolnshire, Norfolk, North Yorks, Cumbria, Cornwall, Hereford & Worcester and Somerset all have more than 5000 miles of non built-up road.

## 1.3 Forecasts of traffic growth on rural roads

A study by Oxford University's Transport Studies Unit for the Countryside Commission (Stokes et al. 1992) warned that 'unless current trends in car use change ... traffic levels will rise dramatically in the countryside'.

The Council for the Protection of Rural England (CPRE) has expressed particular concern over the forecasts of an increase in traffic levels in the countryside of between 89-173% between 1994 and 2025 (CPRE, 1996). The environmental degradation of the character of country lanes to accommodate ever

increasing car use has also come in for particular criticism from the Cyclists' Touring Club (CTC, 1996).

# 2 Safety

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To determine the scale of the accident problem for cyclists on rural roads, two sources have been consulted. First, information on the national occurrence of cycling accidents has been obtained, and secondly, more detailed information on specific types of accident has been obtained from the TRL database of accident records. Selected details of accidents supplied by a selection of County Councils have also been examined.

## 2.1 Road accidents in Great Britain

Information on injury accidents on the public highway is recorded on the accident report form STATS19 by police forces and is collated by the Department of Environment Transport and the Regions (DoT, 1996). Statistics of these road accidents are given in the Department of Environment Transport and the Regions' annual publication Road Accidents Great Britain (RAGB). The latest available publication gives data for the year 1995. RAGB Table 5c shows that in 1995, on all types of road, there were a total of 213 cyclists killed, 3753 seriously injured and 20,947 slightly injured.

The STATS19 records give much useful information. However, the accident records do have limitations, and it is as well to be aware of them. While all the fatal and a substantial proportion of the more serious cycling accidents are recorded, cycle accidents generally (and single vehicle accidents in particular) are known to be under-recorded in the STATS19 records. This is particularly so for cyclist injury accidents on cycle tracks and other locations off the highway where it is estimated that only about 3% are recorded (Mills, 1989).

STATS19 records may also contain very few cycling accidents on roads carrying fast-moving traffic for the simple reason that cyclists are afraid to use them. The roads are not then 'safe', but are on the contrary perceived to be so unsafe that the freedom to use them is restricted. If it is true that this perception of danger is linked to traffic volume, then as traffic levels rise, more roads will become off-limits to cyclists, walkers and other vulnerable road users.

## 2.2 Comparing built-up and non built-up

Most cycling accidents occur in built-up areas. In 1995, there were 22,559 cyclist casualties (91%) on built-up roads and 2299 cyclist casualties (9%) on non built-up roads (RAGB, table 24a). However, of the 213 cyclists killed, 115 were on urban roads and 97 were on non-built-up roads. Therefore although the total number of cyclist casualties is relatively low, almost half (45%) of all cyclist deaths occur on non built-up roads.

Although the number of cyclist casualties is falling, the mileage travelled by cyclists is declining at a faster rate, so that the cyclist casualty rate is increasing. This is shown in RAGB Table 8. Cyclists' casualty rates in 1994 and 1995

were 551 and 557 per 100 million cycle-kilometres, compared with an average for the period 1985 to 1993 inclusive, of 496. Over this period, car driver casualty rates have remained static. Though these rates are reproduced exactly as they appear in Road Accidents Great Britain, the numbers are based on cycle mileage estimates that are, at best, accurate to two significant figures. The latter data is sufficiently unreliable that no breakdown of the amount of cycling on B, C and unclassified roads is provided in DETR data.

Table 1, extracted from RAGB Table 26, shows clearly the difference between cyclist accident rates on rural roads. These rates illustrate the danger faced by cyclists on A roads, and on non built-up A roads in particular.

**Table 1 Cycle accident rate comparisons**

<i>Fatal cyclist casualty rates 1995 per 10<sup>8</sup> cycle-km</i>	<i>A road</i>	<i>Other</i>	<i>Total</i>
Built-up roads	7.3	2.3	3.3
Non built-up roads	26	3.5	9.8

It is unlikely that the general motoring public is aware of these differences, and some form of public education campaign would probably be justified to draw attention to the particular vulnerability of cyclists on rural roads.

### 2.3 Analysis of non built-up roads only

To supplement the data from RAGB1995, STATS19 data from the UK accident database kept at TRL was examined for 1995, for all accidents involving cyclists on roads with a speed limit of more than 40 mph (ie. non built-up roads).

#### 2.3.1 Junction location

On built-up roads, cycling accidents occur mainly at junctions. Of the 23,061 cycles in accidents on built-up roads in 1995, 76% were at junctions. The most common locations were T or staggered junctions (9710 cases), crossroads (2599 cases) and roundabouts (2226 cases). On non built-up roads, 1275 (53%) of the 2397 cycles in accidents were not at junctions. Of those that were, the most common locations were T or staggered (415 cases) and roundabouts (302 cases).

However, the number of junctions is higher in urban areas and the higher number of accidents might be simply because of this. It is not possible, based upon the information available, to comment on whether accident rates at junctions on non built-up roads are statistically different from those on built-up roads.

#### 2.3.2 Manoeuvre

The STATS19 analysis permitted the cross tabulation of junction type and manoeuvre. This revealed that for 1995, a total of 39% of cyclists injured on non built-up roads were hit by vehicles when they were not at a junction and 'going ahead other'. Although the description is open to interpretation and misuse, this contrasts with the built-up

roads figure of 18% going ahead not at a junction.

In a journey through a busy urban area, a cyclist will face many situations that they will perceive as dangerous. This perception will be most acute in areas such as junctions, and during turning manoeuvres. On non built-up roads, nearly 40% of injuries are occurring when the cyclist is not in a location, or making a manoeuvre, that would create the expectation of risk. In other words, rural cyclists appear to be in danger when they are cycling along 'minding their own business'.

#### 2.3.3 Severity versus speed

An analysis of STATS 19 records for 1995 shows that there appears to be an increase in the proportion of accidents that involve death or serious injury as the speed limit increases (Figure 1).

Although there may be other contributory factors that are important, this strongly suggests that severity is directly proportional to the speed limit. If one assumes that the speed limit is closely related to the actual speed, then it would seem likely that reducing speeds would reduce the severity of accidents on rural roads.

The evidence available suggests that a reduction in severity of accidents to cyclists, and a lowering of the incidence of fatalities, would result from measures to reduce speed on some roads currently subject to the national speed limit of 60 mph. Clearly other factors would need to be examined in order to pursue this idea further.

#### 2.3.4 Severity versus weight of other vehicle

The chances of being killed or seriously injured depend upon the other vehicle involved. Cars make up the majority of other vehicles involved, but accidents involving HGVs are generally more serious. The chances of a cyclist being killed or seriously injured in an accident with a car are around 30%. However, for heavy goods vehicles over 1.5 tons, this rises to around 50%.

The presence of some HGVs is, of course, essential for the economic efficiency of rural areas. However, a strategic approach to lorry management and the creation of lorry routes may be supported by this evidence on the relative danger to cyclists.

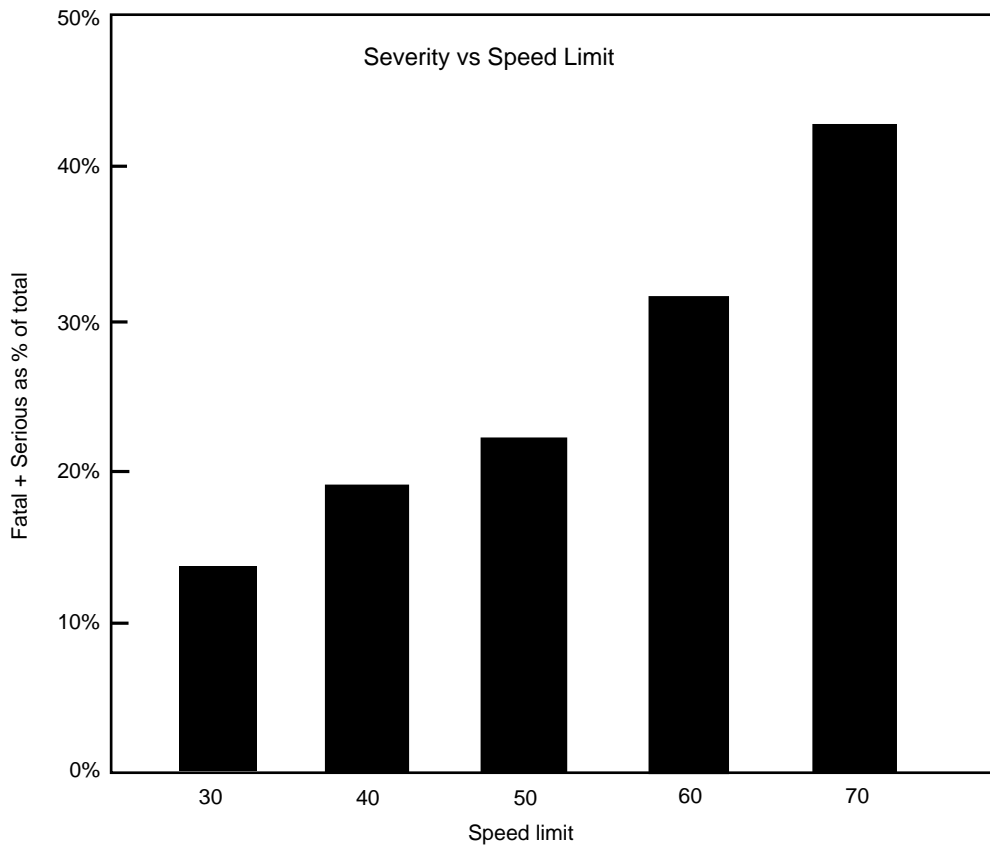
#### 2.3.5 Road type

It is difficult to draw any real conclusions from comparisons of accident severity according to road type. Although rates are higher on the roads with the highest flows, these roads are also designed for higher speeds - figures are not available to separate speed and flow influences.

The recording rate of cycle accidents on cycle tracks is very low. In an earlier study, for the 1 year period 1 July 1993 to 30 June 1994, the STATS 19 records contained only 109 cases in all of Great Britain.

An examination of the relationship between accident occurrence and road curvature shows that on non built-up roads 10 percent of all cycling accidents occur at bends. This compares with only 3% in built-up areas.





**Figure 1** The relationship between severity of cycling accidents and speed limits

## 2.4 County wide comparison

The number of cyclists killed as a proportion of the resident population is shown in Table 2 for some selected counties. Using such small numbers does decrease the accuracy of these figures, and clearly other factors such as vehicle ownership levels will be an influence, but it is interesting to note the extreme difference between the urban and rural counties. More detailed statistical analysis using multiple linear regression studies of all available data might reveal more ‘descriptive’ (but not prescriptive) information.

### 2.4.1 Casual factors as reported at the accident scene

To investigate the contributory factors in more detail for accidents involving cyclists, the description of the accident as recorded by the attendant police officer has been examined. Accident summaries have been studied for 1995 in three counties, Essex, West Sussex and Cheshire, where good cooperation was given by the relevant local authorities.

One item mentioned frequently in the reports is the difficulty of cyclists being seen on rural roads during the hours of darkness. Of the 88 accidents involving cyclists in Cheshire 27 (31%) occurred in darkness and half of these were on roads without street-lighting (8 on A category roads, one on a B category, and 5 on C category or unclassified). Twenty-three of the 94 cyclist accidents on rural roads in Essex (24%) occurred in darkness, 9 of these on roads without street-lighting (four A roads and five unclassified).

**Table 2** Selected counties with high and low fatal accident rate for cyclists

County	Population (thousands)	Cyclists killed	Rate per million pop.
Lincolnshire	606	10	16.51
Cumbria	490	6	12.24
Wiltshire	588	6	10.21
Cambridgeshire	688	7	10.18
Warwickshire	496	5	10.07
N Yorkshire	727	7	9.63
Surrey	1044	9	8.62
Somerset	478	4	8.38
Essex	1570	4	2.55
S. Yorkshire	1305	3	2.30
Gt. London	6967	15	2.15
Cornwall	479	1	2.09
Staffs	1055	2	1.90
Hants	1606	3	1.87
Tyne&Wear	1134	2	1.76
West Midlands	2628	4	1.52
Bucks	658	1	1.52

When examining the detailed accident descriptions, it was noticeable that several of the accident reports mentioned unusual factors such as ‘cyclist with unsecured baggage (carrier bags through spokes)’ or ‘cyclist not looking ahead fell off’. Some attempt was made therefore to study the English language description given by the police for each accident to estimate possible causes of some cyclist accidents. These were categorised as follows:

- ‘Driver’** More care apparently needed by driver of a vehicle other than a cycle (including excessive speed)
- ‘Cyclist’** More care or attention apparently needed by cyclist. This was where the cyclist was reported to have, for example, had no lights, lost control due to inattention, been drunk, crossed carriageway without due care.
- ‘Both’** Poor judgement/carelessness - fault un-attributable
- ‘Other’** Where the cause was some other factor, or was not known. This category includes contributory environmental factors, road hazards, poor or absent street lighting, object/animal in highway, and mechanical faults on either vehicle.

It must be stressed that these descriptions, and the information on which they are based, are subject to judgement and inaccuracy, and are included here as an illustration rather than statistical evidence. Results were as shown in Table 3.

**Table 3 Subjective assessment of contributory factors in cycling accidents on non built-up roads**

County	Category				Total
	Driver	Cyclist	Both	Other	
Essex	27	27	12	28	94
W. Sussex	33	20	11	7	71
Cheshire	27	20	*	41	88

\* No information available

The majority of accidents appear to be caused by lapse of attention or concentration by either the cyclist or the driver, or both. The ‘other’ category indicates that this was not evident in the accident summaries and it is likely that there was some other contributory factor. Environmental factors such as a wet or slippery road, or glaring sun, contributed to approximately 19% of accidents in Essex and 14% of those in West Sussex. Such information was not available for Cheshire.

It is not possible to draw any conclusions from these figures. It does appear that more training, and certainly more care and attention, is needed from both cyclists and other drivers. The fact that a cyclist was ‘messaging around’ at the time does not make an accident any less traumatic. Nor is it fair to say that an unduly high proportion of cyclists are not taking due care, since comparative figures are not available for car drivers (eg. for driving while using mobile phones etc.).

#### 2.4.2 Accident locations

Analysis of the county data confirms that there are few specific sites on non built-up roads with a high concentration of accidents involving cyclists. West Sussex

(total 71 accidents, 49 on A roads) had 13 accidents on the A27, three of them at the Whyke Road roundabout, Chichester, 9 accidents on A259, 7 accidents on A264, 5 accidents on the A23.

Cheshire (total 88 accidents, 54 on A roads) had 7 accidents on the A57 of which three were on Sankey Way at or near the junction with Cromwell Avenue, 6 accidents on A533, 5 accidents on A50. Essex (total 94 accidents, 44 on A roads) had 10 accidents on the busy A414 (formerly the A12(T)). It is not possible in a general review of this type to comment on individual high risk sites.

### 3 Types of rural cycling journeys

There is a tendency for rural cycling to be associated with leisure trips only. The National Cycling Strategy has relatively little to say about rural cycling, and where it is mentioned it is only in the context of leisure pursuits. The recommendations in section 3.7 of the NCS relating to cycling in the countryside are:

- Safe local links to be promoted between town and countryside
- Recreational and leisure cycling to be promoted as an alternative to travel by car.
- The multi-purpose value of cycling investment for health, leisure and transport interests to be recognised.

#### 3.1 Non-leisure trips

Many of the recommendations for leisure cycling routes will also benefit users of bicycles for other purposes. However, it should be recognised that rural cycling takes place not just on specific cycle routes, and not just for leisure.

In the comprehensive study of cycling in rural areas of Cumbria (Bunn, 1995) traffic counts and questionnaire surveys analysed journey purposes and opinions amongst cyclists on a selection of roads in the county. One survey point was just outside the town of Keswick. Key findings from this survey are:

##### **Location: Greta Bridge, Keswick**

- No. of respondents: 89
- Of which proportion resident in Cumbria: 81%
- Mean trip distance: 3-5 miles
- Proportion of trips less than 2 miles: 48%

##### **Trip purpose:**

- work 27%
- shopping 29%
- pleasure 26%
- other 18%

Even in one of the most popular parts of this rural national park, therefore, short utility trips are a significant part of the cyclist numbers.

Further interviews of staff at the British Nuclear Fuels plant in Cumbria showed that cycling represented a higher than national average of trips to work at this rural location. Although the majority of cyclists responding travelled less

than ten miles to work, 20 percent of them cycled regularly 11-15 miles each way.

Although resources limited the sample size, the Cumbrian study does reinforce the view that cycling can be a valid form of transport in rural areas, and should not just be seen solely as a leisure activity.

### 3.2 Recreational routes

The issue of provision of special cycle routes for cyclists in rural areas has been greatly assisted by the activities of the charity Sustrans. Through relentless campaigning, this group has been able to put the provision of cycling facilities on the agenda of almost every local authority in Britain. The ambitious National Cycle Network has been backed by finance from the Lottery and the Millennium fund, and will create more than 2500 miles of cycle routes.

Guidance on the planning of routes forming part of the national cycling routes is given in the publication prepared for Sustrans by the Ove Arup consultancy (Sustrans, 1997).

The need for publicity for recreational cycling routes was demonstrated in the study by Bunn (1995) that included surveys inside tourist information centres and youth hostels where more than 70% of respondents classified themselves as leisure cyclists. Interestingly, 32% of respondents were not actually aware of any of the major recreational cycling routes that passed close by or through the area in which they were surveyed.

## 4 Countryside issues

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Considerable attention is being given to rural road issues by organisations such as the CPRE and Rural Development Commission (RDC) as well as by cyclists' organisations such as the CTC. Besides the problems of traffic and transport, the problems of rural poverty and unemployment are a major concern. Any measures to be imposed must recognise the need for viability and vitality of rural areas besides their amenity value.

The potential importance of cycling for children of low-income rural families was demonstrated in a recent study revealing that they are increasingly geographically and socially isolated through their reliance on 'dwindling or non-existent public transport services'. Although rural children use bicycles for recreation, the survey found that, for them 'narrow roads, lack of pavements and street lighting and distances between settlements all militate against utility cycling' (The Children's Society, 1997).

### 4.1 Cars in the countryside

The main obstacle to the use of country roads by cyclists is likely to come from the increasing use of the car for journeys to, or passing through, rural areas. As traffic levels increase, however, there is the danger that this may destroy the very character that is the countryside's main attraction. As roads become busier, safety concerns make non-motorised modes such as cycling less attractive, and more people will then use cars, leading to a spiral of decline.

For many city dwellers "the national parks and the

countryside of England offer a valuable escape from the rigours of everyday life, and a haven for people to find relaxation and refreshment of spirit. It is therefore rather ironic that 91% of visitors to National Parks arrive by car, thus risking the destruction of the very thing for which they are looking". (Countryside Commission, 1995)

### 4.2 The character of rural roads

Since the publication of the Buchanan report on 'Traffic in Towns' in 1963, it has been recognised that new road building is not the solution to congestion in urban areas. In rural areas, however, the growth in traffic levels has been accompanied by a slow but steady increase in the amount of road space provided; by the construction of new roads, and by schemes to widen and straighten existing ones. Roads that were once meandering country byways are being turned into arterial roads, complete with kerbs and street furniture, often considered out of keeping with their surroundings.

Although this may be seen by the general public as being mainly the concern of countryside lobby groups, there are particular reasons why changes in the character of country roads will have a direct influence on cyclists:

- One of the consequences of improving road provision is that this can lead to an increase in traffic demand (SACTRA, 1994).
- Realignment of roads and improvements in surfacing can encourage higher speeds by motorised traffic. As shown in figure 1 this might directly increase danger for cyclists.
- Widening of roads may also encourage use by heavier traffic, also a hazard to cyclists.
- Removal of roadside vegetation and improved sight lines might encourage overtaking of cycles in places where previously none occurred.
- As the amenity aspect is one that actually determines mode choice for many cyclists, then any degradation of character could materially reduce the number of people choosing to cycle.

### 4.3 Measuring the character of rural roads

If the amount of cycling is being influenced by the perception of danger, then it is of interest to understand what characteristics combine to make a road 'feel' safe or unsafe. A study in the Netherlands commented "strangely enough there has never been a systematical research into the safety of cyclists on different road profiles with different combinations of car speed and intensity. Yet there is a need for such criteria" (Godefrooij, 1992.). The study produces a diagram as a guide to where segregation is needed, based upon 'practical experience and common sense'.

The Ash Consulting Group also investigated threshold levels on rural roads for the CPRE (CPRE, 1996) and has also based the categories on feelings and judgement (Table 4). This then has no 'scientific' basis, in that it is not a modelled composite of actual measured values, and it is not replicable.

**Table 4 A banding system prepared for the CPRE showing perceptions of traffic on rural roads**

<i>Average number of vehicles daily (ADT)</i>	<i>How many vehicles is this each minute</i>	<i>What does it feel like</i>
5,000 and over	approx 6 vehicles plus	steady traffic presence and loss of rural character
2,000 - 5,000	approx 2 vehicles plus	not pleasant to cycle or ride
800 - 2,000	approx 1 vehicle plus	calm traffic may make cycling or riding acceptable; walking less pleasant
<800	approx one vehicle every 90 seconds	walking with children may feel unpleasant

Given the apparent desire for a classification system, there are two possible means by which this type of work could be extended. Firstly, a comprehensive data collection exercise might reveal, via statistical analysis, the relationship between geometric layout and safety. Alternatively, building upon the subjective criteria, a review panel could expand the authority of the CPRE work. Some conformity of views could also be achieved by using detailed guidance and checklists. An example of this structured evaluation of judgement can be seen in the methodology used by the OFSTED teaching inspectors. (OFSTED, 1995). The outcome of such a study could be an invaluable part of the creation of a comprehensive rural transport network study.

#### **4.4 Measuring the actual risk to cyclists on rural roads**

In recent studies by TRL the risk associated with selected road design features has been assessed using statistical analysis techniques. Thus, for example, by studying the design and accident record of several hundred signalised junctions, patterns can be identified (Vincent, 1994). In order to achieve statistical reliability, it would be necessary to have a large database of rural cycling problem sites, including measurements of design features such as hilliness and bendiness etc.

Work by Lupton (1996) has shown that modern mapping techniques might be able to automate some of the data collection needed, for example by using ‘cubic splines’ to measure the curvature of a road directly from a digital map. Bends can be a problem for cyclists, but as yet little is known about which types of bends are the biggest problem. Research in this area might help to shed light on the question of whether decreasing (or increasing) curvature of rural roads would help to reduce cycle accidents.

## **5 Current best practice**

The present research fortuitously coincided with a survey by the Cyclists’ Touring Club (CTC) in which every local authority in Great Britain was asked about their policies on rural roads with particular reference to cycling. Although a precursor to a campaign to protect the character of rural roads, the questionnaire was sent without campaign literature so as not to prejudice the results. Full access was given to the results of this survey so that direct interpretation of the local authority response was possible.

The survey found that many authorities have strategies that aim to provide safe and attractive networks of rural cycling routes that will allow cyclists convenient access to local centres, public transport facilities, schools and for leisure

purposes. Most authorities have a preference for segregated routes, rather than encroaching onto existing road space.

In recognition of the importance of the amenity value of rural roads, just less than half the authorities (24 out of the 54 who responded) had developed, or were in the process of developing, policies or a strategy relating to the amenity or landscape value of their rural lanes. The underlying aim of these policies was to preserve the character and beauty of rural lanes and enhance the roadside environment.

Several authorities recognised the need for higher maintenance standards on roads and tracks used by cyclists. However, other authorities attach a low priority to rural road ‘improvements’ unless there is an inadequate safety record, or the improvements specifically assist pedestrians and cyclists. This is partially due to policy decisions and partially because of the arrangements for funding ‘packages’ which have, to date, been predominant in urban areas.

#### **5.1 Surveys of cycling on rural roads**

Some authorities have carried out usage surveys on existing or potential cycle routes. Others have counted cyclists as part of a specific strategic initiative. However, the technical difficulty of including cyclists in classified automatic traffic counts means that very few regular bicycle counts take place. Manual classified traffic counts would usually include cycles but these may be carried out only in the preparation of a planning application or prior to the introduction of safety measures. This happens much less frequently than it would in an urban area.

The development of a Recreation Strategy for Somerset followed surveys that highlighted the problems created by visitors to the countryside, particularly those in motor vehicles. Also in Somerset, the ‘Pedal the Levels’ study in 1994 made recommendations for the promotion and development of recreational cycling in the county. The Lake District strategy specifically mentions the difficulty of measuring, using objective data, the recreational value of rural roads.

#### **5.2 Speed restrictions below 40 mph**

The CTC survey sought information about speed restrictions below 40 mph applied to any rural lane or network, other than within a village or other settlement. This was in recognition of the increase in severity proportional to increasing speed limits (as illustrated in figure 1). It must be stressed, however, that the relationship between actual speed and speed limits, particularly on remote rural roads, is still relatively unknown.

Devon, Kent, North Somerset and Surrey already have 40 mph restrictions on some roads other than within villages or other settlements. Cornwall is currently assessing the feasibility of introducing 40 mph rural traffic management zones and Dorset is considering speed restrictions, specifically regarding the Purbeck area. Newport, Wales, is also considering restrictions in some areas.

In Scotland, Falkirk has two stretches of 30 mph on rural lanes. Both are fairly short, one being a half mile stretch between two existing 30 mph limits. One difficulty encountered in the Lake District was that a short section of speed limit required what was considered to be an unacceptably intrusive number of signs at every entry point. This suggests that the introduction of speed limits on an area-wide basis would be less visually intrusive.

The island of Jersey has taken advantage of its unique status to introduce a 15 mph speed limit on a network of 'Green Lanes'. No supporting speed-reduction measures have been used, although the character of the lanes already deters higher speeds. No significant results are yet in place, and there is certainly no evidence to support a 15 mph limit rather than 20 mph. The island authorities are, however, very pleased with the impact that the scheme has had in attracting sustainable tourism.

### 5.3 Other facilities for the promotion or safety of cycling on any part of the rural road network

Nearly a third of the authorities that responded mentioned existing or proposed cycle routes on rural roads. Many of them have produced promotional leaflets, some of which contain safety advice. Derbyshire has also recently produced a leaflet entitled 'Safety and group cycle rides' and their cycle training, in schools and elsewhere, includes training for the rural road network, as in Devon, another rural county.

Suffolk takes particular care to ensure the extensive signing of minor roads used as cycle routes, particularly where they cross major trunk roads. This is considered to have a safety benefit in advising motorists of the likelihood of encountering cyclists. Wiltshire considers that the key to the success of the Wiltshire Cycleway was strong 'branding'. Monmouthshire are currently developing several ideas for rural traffic calming, including road narrowing with passing places; short cycle lanes on the inside of blind corners; and 'Gateway' features at junctions with the National Cycle Network.

Cyclists' representative groups are involved in close liaison with several authorities. Cyclists have a vital role to play in identifying hazardous locations and due to the expansive nature of the rural network, may be the only ones to notice where road changes are needed. Their advice to the highways authorities can then be invaluable in identifying problems which might otherwise easily be missed.

### 5.4 STAR

One of the more interesting case studies, in that it takes a holistic approach to the safety of rural transport including cycling, is the initiative called STAR - Strategic Traffic Action in Rural areas. This is a three-year project jointly

funded by Surrey County Council and the Countryside Commission. The study area covers an attractive well-populated rural area with high car ownership levels, and a tradition of car use for commuting, for leisure and for school journeys. Consultation at parish council level revealed the extent of the problem. Heavy congestion, high speeds and rat-running traffic were reported, while socially-essential facilities are inaccessible except by car.

The Surrey CC consultation document remarks that 'something must be done to promote acceptable alternatives to the car and to reduce people's reliance on cars and travelling in general'. This is being approached in two directions: first the *attractiveness* of the alternatives is being increased through the introduction of cycle facilities and speed reduction measures. Secondly, the *acceptability* of the alternatives is being increased through the use of high quality design and materials, and the use of the STAR brand name.

More far-reaching proposals are based upon the premise that 'demand management could be used to help reduce the damaging impact of residents' dependency on the private vehicle'. In practice, however, the short term proposals are based upon more acceptable elements such as bike hire, park and ride, and public transport promotion. A 40 mph speed limit has been proposed, with 20 mph in villages using traffic calming measures developed in conjunction with landscape design consultants.

### 5.5 Kent

The county of Kent is involved in several countryside projects that take a broad view of rural traffic management. These cover issues such as the amenity, and even the historic, value of country roads. Although not directly and specifically aimed at cyclists, two particular projects in Kent will be of benefit to cyclists and these have been included as an appendix to this report.

## 6 Rural roads traffic management

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The use of comprehensive traffic management to improve rural transport was mentioned by less than 5 authorities. The Lake District authorities have probably advanced furthest in this, although in Scotland, a pilot 'Rural Roads Hierarchy' exercise is to be undertaken in the Banff and Buchan area of Aberdeenshire. The idea is beginning to gain ground, and offers a potential solution of how to provide for cyclists in rural areas. Money spent on a comprehensive strategic approach has the possibility of benefiting more cyclists over a wider area than the equivalent amount spent on single sites.

As revealed in the accident analysis, the overall safety of cyclists in rural areas is of concern but, because accidents are dispersed, there may be no statistically defined high-risk sites. Where this has happened in urban areas, it has led to the adoption of route action, area-wide urban safety management and mass action plans.

The Urban Safety Project was part of a Department of the Environment Transport and the Regions research programme. It was a large-scale safety management

project covering five towns in England, to demonstrate the benefits of a strategic area-wide approach (Mackie *et al.*, 1990). One major factor in the project was that a hierarchical plan for road functions was adopted (as first promulgated in the Buchanan Report on Traffic in Towns in 1963). Traffic management measures were then used to redistribute traffic on to the most suitable routes and to control speeds for the benefit of vulnerable road users.

## 6.1 Road hierarchy

Roads have two basic, but possibly conflicting, functions: to move traffic smoothly and without interruption, and to provide safe access. The provision of access will often necessitate interruption to traffic flow, hence the conflict. The function of any specific road, therefore, is a balance between these two extremes. The preparation of a road hierarchy provides a basis on which to examine the function and character of roads with the aim of providing an ideal pattern in which all roads are used optimally for road safety, movement and environmental requirements. A reclassification may have legal and administrative implications. In the short term it may be necessary to have one classification for network study and one for legal purposes.

The direct benefit for cyclists of a clear road hierarchy is that a comprehensive network can enable a continuous network of routes suitable for cycling to be created without detriment to other essential users. Once the hierarchy has identified an 'ideal' network, efforts should concentrate on achieving it. This will include, for example, improvement of roads higher up the hierarchy where there are sections missing or substandard. Such improvements will encourage fast traffic to stay on the main routes, and make more acceptable measures to slow traffic on the lower order routes.

At the lower levels, efforts can be directed at reducing traffic speeds and volumes with the objective of providing a continuous network of 'quiet roads' for the enjoyment of cycling and walking. As with urban provision, the aim should be not just for occasional cycle routes, but for a complete network that is coherent, direct, attractive, safe and comfortable. This would help to encourage the use of the bicycle not just for scenic journeys, but as transport throughout a meaningful network.

One factor that should make traffic calming on lower order roads acceptable is that a typical journey will include very few miles of country lanes. The average journey includes mainly A-class roads, so overall a journey might lose only one minute per hour (although clearly there will be exceptions to this).

The Urban Safety Project had extensive monitoring over five case study areas. This was necessary because of the possibility of measures not actually reducing accidents, but simply redistributing them. It will be important that careful consideration is given to the monitoring of all of the impacts of rural traffic management projects.

### 6.1.1 Lake District hierarchy

The Lake District Strategy was prepared for the agreement of the Lake District Management Initiative, a consortium of Cumbria County Council, the Lake District National Park Authority, the Cumbria Tourist Board and the Countryside Commission. This arose out of a recurring concern about the impact of motorised traffic in the Lake District. The aims of the strategy were to tackle the following issues:

- Congestion on the roads and in car parks
- The difficulties of achieving access without the use of a personal motorised vehicle
- Speed, fumes and conflict with other road users (particularly non-motorised modes including cycling)
- The impact of noise and visual intrusion of vehicles in a rural environment
- The implications for character and quality of the rural environment if the pressures exerted by vehicles are accommodated.

The protection of 'quiet transport' (ie. cycling, walking and horse riding) is mentioned several times in the Lake District Strategy. The joint structure plan for Cumbria and the Lake District states that 'the scenic beauty, natural resources and quality of the built environment of the Lake District National Park will be firmly protected and enhanced, whilst fostering the quiet enjoyment and understanding of the park and the social and economic wellbeing of its communities'. On traffic in the park it states that "traffic congestion and the environmental impact of vehicles will be reduced by traffic management and improvements to public transport. Such measures will have regard to the environmental qualities of the park and the needs of local residents and visitors including those not using private cars".

The mechanism proposed by the County Council was to prepare a strategic analysis of the transport network in the area based upon a road hierarchy. Unfortunately, whilst all members of the Management Initiative could agree on some (non-contentious) elements such as improvements to public transport, it was more difficult to reach agreement on controlling traffic. Most people living on roads scheduled to be upgraded in the hierarchy were concerned about extra traffic. Equally, all the business premises on roads scheduled to carry reduced traffic complained because of the reduction in passing trade. The businesses had the support of the Cumbria Tourist Board and represented a powerful lobby.

After extensive negotiation between the various parties, a compromise was eventually reached. This proposed a two-tier hierarchy in which strategic routes were developed by the County Council, with individual areas having a specific local plan developed by the County with the involvement of parish councils. A strategic network of routes to be recommended for tour buses was acceptable to all (helped by the inclusion of new passing places). A county wide network of cycle routes was also acceptable, especially where this meant segregation rather than integration.

## 7 Countermeasures

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For single problem sites, or more usefully for the reinforcement of a comprehensive management strategy, specific traffic countermeasures may be required. Sometimes this may include the provision of additional space specifically for cyclists. As with urban areas, however, 'safe routes for cyclists' can be as desirable as segregated cycle routes.

Although the introduction of measures to assist cyclists on rural roads is at an early stage, the ideas that are currently at the planning or consultation stages do provide interesting case study material. The cycling development group Sustrans have recently published the first update of their design manual intended to guide practitioners in the preparation of cycle facilities, particularly those associated with the National Cycle Network (NCN). Sustrans (along with the case study areas mentioned above) recommend the use of network management such as road hierarchies with physical measures used to achieve the reduction of traffic speeds and volumes that are essential for safe and comfortable cycling (Sustrans, 1997). The Countryside Commission is also promoting the concept of 'quiet lanes' - roads on which cycling and walking can be enjoyed without interruption from traffic.

### Measures to reduce speed/volume in the lower hierarchy would include:

- In extreme cases, full road closures to all vehicles except non-motorised.
- Access restrictions for local essential motor traffic only.
- Roads that include gates, including 'real' gates that require car users to get out to open and close, are ideal for restricting volumes and speed.
- The hierarchy can be reinforced (at low cost) via the strategic use of signposts. Devon, for example, have tried signs with different colour schemes.

### Measures to control local speeds to provide protection where a cycle route crosses a main road:

- Changing the give way arrangements at a junction can be useful. This can then favour the route with the most cyclists.
- Junctions are critical and can be expensive. Many busy A-roads are almost impossible to cross at-grade. But the cost of one footbridge is almost the same as ten kilometres of route treatment. It is worth, therefore, diverting routes to share other grade-separated facilities.

### Measures on specific links to provide space for cyclists:

- Separate lanes for uphill cyclists are recommended by Sustrans because that is where speed differentials are highest.
- Instead of using central reservations that can restrict lane width and force cars over to the edge of the road, the use of verge-side strips for cyclists can be used to restrict width and reduce speeds.
- On roads with more than one lane in the same direction, a wider inner lane or a well-marked marginal strip would give cyclists an extra margin of safety.

One area where more research is needed is related to visibility at bends. Clearing of vegetation has been recommended in previous (but not the current) Sustrans design guides. There is uncertainty over whether speeds are actually increased by good visibility, and therefore whether bad visibility may actually have advantages.

### 7.1 Innovative but untried

As part of the move towards innovation in rural road management, several authorities have introduced measures on a trial or experimental basis. Others have given consideration to ideas that have not yet been tried. There is too little evidence yet available to determine whether these will reduce accident occurrence, and there is certainly no knowledge regarding the likelihood of accidents not actually being prevented, but simply 'migrating' to the alternative routes. More importantly, even if local improvements do accrue from these measures, there is a possibility that their indiscriminate use might lead to a degradation of their effectiveness. It might be, as the recent study for the County Surveyor's Society and Countryside Commission and Council for Wales concluded 'The need is not for a different policy base, but for effective mechanisms for the delivery of current policy' (CSS/CCW, 1995).

## 8 Conclusion

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Many urban areas in the UK have reached the point where they have little scope for absorbing more traffic growth. High levels of urban congestion and high parking costs provide a limitation on additional journeys by car. In contrast, many countryside areas are still experiencing high traffic growth. Rural roads that once provided a tranquil setting for cycling and walking are increasingly becoming used for commuter journeys and some are now experiencing congestion.

Studies suggest that leisure and occasional cyclists perceive traffic to be more dangerous than do regular cyclists. Increasing traffic will be a disincentive to these new users, particularly those with children. The prospect then is that more and more areas of the countryside will become off-limits to future generations of cyclists.

Cyclist injury accidents on non-built-up roads usually involve a motor vehicle, more often than not a car, and cyclists are at greatest risk of injury on A roads. The incidence of accidents involving cyclists on rural roads is still relatively low. However, there is every reason for concern because:

- Cycle accidents on non built-up roads are more likely to be fatal or severe than those on built-up roads
- Accidents are spread over a wide area and are therefore not likely to reduce because of single-site treatments
- Accidents occur to cyclists in locations which the cyclists might not consider to be dangerous
- There seems clear evidence that severity of accidents is directly proportional to speed limits.

The use of a rural hierarchy of roads appears to offer a potential framework on which to base rural road management. Experience in the Lake District suggests that implementing this will not be easy due to the wide range of countryside lobby groups. Some central strategic planning can be effective, but there will be a particularly strong need for local consultation, probably at local parish council level over long periods.

## 9 Recommendations

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This research supports or gives weight to the following recommendations:

- Efforts should be made to draw the attention of the motoring public to the severity and high risk of cycling accidents on country roads.
- In order not to discourage new cyclists from rural roads, all efforts to control the unrestricted growth of motorised traffic in rural areas should be supported.
- As with urban cycling, there is a need for a comprehensive network of routes for rural cycling. This should offer a network of routes that are coherent, direct, attractive, safe and comfortable.
- In order to increase the safety of rural cycling, consideration should be given to reducing speeds on some rural roads.
- In order to reduce the severity of accidents to rural cyclists, consideration should be given to a strategic approach to heavy goods vehicle management and the creation of rural lorry routes.
- In order to create a network of safe routes for cyclists without detriment to other essential rural journeys, changes should be introduced within a suitable traffic management framework. This will be assisted by the preparation of rural road hierarchies. Further assistance on this issue would be of value. Future research should aim towards developing a methodology for this that is reliable and replicable.
- A full statistical study of the relationship between rural cycling accidents and selected layout and design features, such as bend curvature, would help to improve design guidance.
- As many measures to provide for cyclists in rural areas are relatively new, any new measures introduced by local authorities should be very carefully evaluated to ensure that real safety benefits are obtained.
- Work to take forward the National Cycling Strategy should recognise the diversity of rural cycling for utility purposes and not just for leisure.

## 10 Acknowledgements

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## Appendix A

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### Rural traffic management in Kent

Kent possesses a rich heritage of rural lanes that date back to medieval, Saxon and pre-historic times. All these are now considered at risk from the pressures of modern traffic. In the third review of the Kent Structure Plan policy ENV13 states that “rural lanes which are of landscape, amenity, nature conservation, historic or archaeological importance will be protected from changes that would damage their character, and enhanced”.

### Comfort zones

Another important initiative in Kent, and one that has progressed through to the funding stage, is the COuntryside Management FOR Rural Traffic (COMFORT) Zones project.

This has four general aims: To improve safety, improve access for all, encourage sustainable tourism, and encourage sustainable local travel patterns. These quite naturally arise from, and support, the County Council’s core values including safeguarding the future and giving priority to those most in need.

The Council are particularly concerned that high-speed motor traffic on minor roads restricts their use by others: the unpleasantness of using some roads deters pedestrians, cyclists and equestrians, restricting their use of the highway network. With fewer non-motorised users the problems are exacerbated, with drivers not anticipating meeting vulnerable people. Specific transport objectives therefore include making walking and cycling more attractive, and reducing the impact of road traffic by channelling through traffic onto suitable routes and improving traffic management.

A major element of the strategy is speed management. All roads in the study area, except for a trunk road and a primary arterial road, are to have speeds restricted. Outside of the built-up areas a blanket speed limit of 40 mph is to be applied. Existing 30 mph limits on residential roads will be retained, or reduced to 20 mph as will some very minor rural lanes. Some road closures are also proposed, and a substantial part of the minor road network will have access-only orders for heavy goods vehicles.

On an experimental basis, it is proposed to indicate the speed limit using roundels painted on the carriageway (permitted only if accompanied by signs) so as to reduce the visual impact of the required standard signposting. The general lack of physical measures within the study areas ensures that the proposals are relatively inexpensive (though their effectiveness, long-term, is not known). A total of £80,000 is estimated to be sufficient to allow the blanket speed limit over most of the Kentish Marsh.

### Tonbridge and Malling

Tonbridge and Malling district council incorporated the County environmental policy into their own Borough Local Plan. In an attempt to investigate the practical implication of this, the two councils carried out a Rural Roads Study in 1996. The objectives of the study were to devise a methodology for identifying important rural roads so that their protection could be provided for. This required a multi-disciplinary approach, and contributions were sought from archaeologists and historians besides engineers and planners.

Criteria were established to identify exactly the important features of a rural road. A structured (albeit subjective) judgement was then made against each of these criteria. By applying a weighting factor to each and summing the total across all criteria, an overall score can be achieved. As the report notes, however, “the individual score attributed to each lane is not necessarily important in itself, but the groupings of lanes with higher score or low scores can be used to prioritise and focus areas for policy initiatives”.

Figure A1 shows the survey sheet used in the study. This gives some idea of the range of topics examined, and shows the many aspects of a road, other than for the single function of carrying motor vehicles. The results from this study were used to guide short term measures such as the choice of material for signposts, and long-term aims such as working towards the reduction or removal of HGVs on some routes.

<b>1. LANDSCAPE</b>		<i>Lane ref:</i>		<i>Lane name:</i>			
<b>DISTRICT</b>				<b>OS CLASS</b>			
LENGTH (Km)		UNDULATED		WINDING		ISLANDS	
SINGLE & PASSING		INTERMEDIATE		TWO-WAY		SUNKEN	
RAISED		DITCHES		BUILDINGS		TREES	
WOODLAND		ORCHARDS		BUILDING NAME			
CONTINUOUS HEDGE		BROKEN HEDGE		HEDGE & TREES		BRIDGES	
<b>LANDSCAPE CHARACTER AREA</b>							
<b>2 AMENITY</b>							
WIDENING		ERODED VERGE		KERBSTONES		DEVELOPED	
ACCESS CREATION		CABLES		LITTER		SIGNING	
BRICK WALL		CONCRETE WALL		STONE WALL		OTHER WALL	
INTERWOVEN FENCE		CLOSEBOARD		CHESTNUT		OTHER FENCE	
NOISE		OTHER FACTORS					
WALKERS		HORSES		BRIDLEWAY		L.D.P.	
CIRCULAR WALK		CYCLE ROUTE		APPROACH ATTRACTION		TOURIST ROUTE	
<b>TOURIST ROUTE NAME</b>							
<b>3 NATURE CONSERVATION</b>							
DIVERSE VERGE		DIVERSE HEDGE		SSSI/SNCI		MACHINE CUT	
VERGE WIDTH		OTHER FACTORS					
<b>4 HISTORY/ARCHAEOLOGY</b>							
SCHEDULED MONUMENT		MONUMENT NAME					
MANY EARTHWORKS		LESSER EARTHWORKS		AMORPHOUS EARTHWORKS			
ROMAN ROAD		IRONWAY		DROVE ROAD		TURNPIKE	
APPROACH TO HISTORIC ATTRACTION		LITERARY		REFERENCE			
<b>NOTES</b>							

**Figure A1** Summary sheet used for survey purposes in Tonbridge Rural Lane survey

## Abstract

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Roads in non-built-up areas account for only 9% of all cyclist casualties, but almost one half (45%) of all cyclist deaths. The reasons for this imbalance are examined, paying particular attention to the relationship between severity of accidents and speed limits. The issue of rapid growth in vehicle numbers is examined, particularly on rural roads that once provided a tranquil setting for cycling and walking. The report considers the provision made for cyclists on rural roads. Recommendations are made for traffic management initiatives to improve conditions for all non-motorised modes incorporating the use of a rural hierarchy of roads.

## Related publications

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TRL 266 *Attitudes to cycling - a qualitative study and conceptual framework* by D G Davies, M E Halliday, M Mayes and R L Pocock. 1997 (price code E, £20)

PR 85 *Speed reduction in 24 villages: details from the VISIP study* by A Wheeler, M Taylor, J Barker. 1994 (price code L, £40)

TRL202 *Trials of rural road safety engineering measures* by J Barker. 1997 (price code H, £30)

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