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New Directions in Speed Management

– A Review of Policy

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Department of the Environment, Transport and the Regions: London

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Foreword

REVIEW OF SPEED POLICY

As the Head of the Road Safety and Environment Directorate, I am very pleased to enclose the report of the Review of Speed Policy.

In its White Paper on the Future of Transport, the Government said that in the interests of achieving our road safety targets it would develop a speed policy that would take account of the contribution of reduced speeds to environmental and social objectives as well as to road safety.

You launched the review in October 1998. Since then I have had responsibility for ensuring that the review reaches a successful conclusion.

To this end, we have consulted representatives of environmental interests, motorists, local authorities, the police, academics and many others to reach an informed view of the issues.

Our road safety record is one of the best in the world but we can do better, particularly for the most vulnerable road users and especially children.

Vehicles speed is perhaps the most important contributor to road casualties so we need to tackle this issue if we are to achieve our targets.

We have looked closely at the precise nature of the problem on the different road types to establish whether change was required in the speed limit, the actual speeds driven, or both.

We have examined how we could develop best practice in engineering, enforcement, education and publicity to achieve a workable and cost-effective approach.

The review has taken us a long way forward. We believe that a national framework for determining appropriate vehicle speeds is needed, but we also have to deepen our understanding of the affects of speed on the environment and the trade offs with the economy.

Our aim should be for appropriate speeds on all roads. Speed limits to manage vehicle speeds will need to be rational, consistent, readily understood and appropriate for the circumstances. Such limits should help gain both compliance and even lower speeds where conditions dictate. Together these will make an important contribution to the reduction in death and injury on our roads.

I believe the recommendations in the report provide a sound framework for the future and I commend it to you and your ministerial colleagues.

Yours sincerely,

John Plowman
Road Safety and Environment

CHAPTER 1
Introduction

Origins of the Review

1. When the Government published the White Paper *A New Deal for Transport: Better for Everyone* it decided to set in hand a review of speed management. There was a widespread view that people were driving cars and other motor vehicles too fast. Many people thought speed limits should be lowered and that lower limits would automatically improve safety and bring environmental benefits. Others thought that limits were not observed because they were too low. So this review was:

> "to develop a speed policy that takes account of the contribution of reduced speeds to environmental and social objectives as well as to road safety."

2. Policies were to be practical and cost effective because damaging the economy would not meet wider social objectives.

3. We have consulted many people with valuable views and advice about speed issues. We have met groups of representatives of environmental interests, motorists, local authorities and the police. We issued a discussion document in August and held a conference on 15 September last year attended by 300 people. While we were undertaking the review, the Scottish Executive and the National Assembly for Wales were created and their staff have taken part. Although national speed limits are a Great Britain responsibility, local ones are very much a matter for the Executive and the Assembly in Scotland and Wales.

Policy background

4. The wider policy background is important.

ROAD SAFETY STRATEGY

5. We had already announced proposals for a road safety strategy for the next decade with casualty reduction targets. The strategy will include the Government's response to the principal conclusions of this speed review. Ministers particularly want these policies to address child road safety.

CLIMATE CHANGE

6. The UK has taken on challenging targets for reducing its greenhouse gas emissions. Under the Kyoto Protocol, it has a legally binding target to reduce emissions of a basket of greenhouse gasses to 12.5% below 1990 levels by 2008-2012. It also has a domestic goal to reduce emissions of carbon dioxide, the most important greenhouse gas, by 20% below 1990 levels by 2010. Changes to speed policy could have positive or negative effects on our ability to meet climate change targets.

AIR POLLUTION

7. Road transport is one of the major sources of local air pollution. It also accounts for two-thirds of all emissions of four of the eight pollutants for which the national air quality strategy sets reduction targets. One suggestion for improving air quality in urban areas is to introduce suitable traffic management schemes. We need to consider what is suitable.

HEALTH

8. The White Paper *Saving Lives: Our Healthier Nation* sets targets for reducing deaths and serious injuries from all accidents. There is also reference to reducing road casualties in the Scottish White Paper *Towards a Healthier Scotland*.

9. Cutting traffic speeds could also help achieve other health objectives. Reducing coronary heart disease and stroke is another priority in *Our Healthier Nation*. The Department of Health recommends people take more exercise, such as more walking and cycling "in a safe environment."

10. An improvement in air quality would reduce respiratory disease and lessen its effects.

11. Targeted measures to moderate vehicle speeds can encourage more cycling and walking by making them safer and more attractive. Surveys show clearly that fears of traffic danger, and speed in particular, lead more parents to take their children to school by car (see for example Hillman et al 1991). This is turn contributes to the peak hour traffic levels.

REGENERATION

12. Thriving town centres are the focus of urban life. People want well-planned, attractive town centres where they can live and work and enjoy shopping and the local culture. Speed management can contribute to a safer, more pleasant environment and to a wider choice of transport. Traffic calming measures that are sympathetic to their surroundings can, for instance, encourage walking and cycling. Traffic management can be engineered to improve reliability for bus journeys.

13. Speed management in rural areas can help prevent communities being cut in two by frequent fast traffic through villages.

THE ECONOMY

14. There are wider economic implications too. There are real benefits to industry, business, commuters and other motorists of being able to reach their destinations reasonably quickly.

15. Reliable journey times are also important for lorry and bus movements because they are a foundation of many modern industries, and are taken into account when investment is planned.

16. Reducing speeds in congested conditions can be helpful, of course, but unnecessary suppression of speed could be damaging.

GENUINE CAR DEPENDENCE

17. Speed management policy may particularly affect people who rely on car transport in the absence of any realistic alternative. Motor vehicles are essential to many people, especially those with mobility impairments or who live in rural areas. Their needs must be recognised.

OBJECTIVES

18. These are the objectives that speed management policy sets out to meet. Clearly some of these are not compatible. Speed policy involves difficult decisions on trade-offs between benefits and disadvantages and must resolve conflicts between objectives to strike the right balance.

19. This document does not contain all the final answers. We expected to find areas where the available information was not good enough for us to be confident about every detail, and we have found some. We need better tools for judging cost effectiveness of some measures.

20. There will be more work – and more consultation – to develop policies in detail. We need to be aware of future changes, for example in vehicle performance, which might provide better ways of achieving objectives. But we do know enough to set the directions in which policy might go and to recommend action now where the review reveals flaws in what we are doing.

The Review and Report

21. The review was launched on 23 October 1998 by Lord Whitty. It was divided into three stages. The first stage was to identify the main policy issues through consultation within DETR and other government departments. We also began to explore existing research on traffic speed and its effects, and to undertake an analysis of current practice and legislation, both here and abroad. We will publish the full literature review later this year.

22. The second stage was for wider consultation on the impact of speed and the effectiveness of current policies. We issued a discussion paper on 10 August which set out current policies and evidence from research. We had more than 100 responses.

23. The third stage of the review involved analysing the results of both the consultation and the literature review to prepare recommendations and conclusions.

24. This report sets out the findings of the review of speed policy. It makes recommendations for future polices, and areas where further information is needed to help develop new initiatives.

25. Research referred to in the report is listed on pages 36 to 38 alphabetically by source.

26. The terms used in this paper are set out in the technical annex.

CHAPTER 2
Findings

The effects of speed on road safety

WHERE AND WHEN CASUALTIES OCCUR

27. The table below shows the number of people killed and injured by type of road in 1998. It shows totals for killed and seriously injured (ksi) and for all casualties. The figures in brackets show the number of children up to the age of 15 years in each category.

	Motorways		**Built-up roads**		**Non-built-up roads**		**All speed limits**	
	ksi	all	ksi	all	ksi	all	ksi	all
Pedestrians	69 (3)	118 (5)	9652 (3588)	43005 (17591)	760 (146)	1763 (375)	10481 (3737)	44886 (17971)
Pedal cyclists	3 (0)	10 (0)	2790 (821)	20965 (6562)	519 (94)	1948 (368)	3312 (915)	22923 (6930)
Car drivers & passengers	1050 (68)	11996 (908)	9337 (596)	126743 (9712)	11289 (551)	71735 (5239)	21676 (1215)	210474 (15859)
Two-wheeled vehicles	110 (0)	430 (1)	3716 (54)	17818 (241)	2616 (19)	6362 (69)	6442 (73)	24610 (311)
All other vehicles	243 (3)	1575 (21)	1109 (108)	14494 (1878)	992 (28)	6250 (475)	2344 (139)	22319 (2374)
All casualties	1475 (74)	14129 (935)	26604 (5167)	223025 (35984)	16176 (838)	88058 (6526)	44255 (6079)	325212 (43445)

(Source, DETR 1999a)

PEDESTRIANS AND CYCLISTS

- In urban areas, injuries to pedestrians were about 20% of total casualties but 36% of the killed or seriously injured.

- Of all killed or seriously injured children (15 years and younger), 61% are injured as pedestrians. Children make up 37% of all pedestrian casualties and 41% of those in urban areas.

- Injuries to pedal cyclists were 7% of all casualties and 7.5% of the killed or seriously injured. Of these 31% and 29% respectively were children.

DRIVERS AND PASSENGERS

- The largest proportion of injuries on built-up roads are sustained by car drivers and passengers who make up 57% the total, about 35% them killed or seriously injured.

- Most road deaths (54%) occur in rural areas. By far the largest group (65%) are car drivers and passengers.

- Of all car occupant deaths, about 70% occur on rural roads and this is the largest single group of deaths on any category of road.

- The motorway network sees about 4% of total injuries, 3% of the killed or seriously injured and 5% of fatal casualties.

CASUALTY RATES

28. If we take into account the distance travelled by different transport methods, riders of bicycles and two-wheeled motor vehicles are about equally likely to be injured. The rate is about 580 casualties for every 100 million vehicle kilometres. But a rider of a two-wheeled motor vehicle is nearly twice as likely to be killed or seriously injured as a cyclist.

29. The rates for car drivers are 36 casualties per 100 million vehicle kilometres and 3.7 killed or seriously injured casualties (DETR 1999a).

30. There are some doubts about the quality of the data on distance travelled.

31. A study of walking patterns in Northampton in 1994 indicates that the risk to pedestrians is about 400 casualties per 100 million kilometres walked and just over 60 casualties per 100 million roads crossed (Ward et al 1994).

32. The rates commonly used for pedestrians are measured in casualties per 100,000 people. These are 78 pedestrian casualties per 100,000 population or 18 killed or seriously injured. Measured this way, the rates for cyclists are 40 and 5.8 respectively.

TIME OF DAY AND COLLISIONS

33. Between the hours of 1900 and 0700 about 15% of the total vehicle kilometres are travelled. During this same period about 30% of injury accidents are reported. So the average risk of an accident per kilometre travelled between 1900 and 0700 is double that for the period 0700 to 1900. The likelihood of being involved in an accident in the evening is far greater for the 16 to 25 age group than for any other age group (Thorburn Colquhoun for DETR, to be published)

SPEED AND THE RISK OF COLLISION

34. The relationship between speed and safety is a complex one. But from the national and international literature there is overwhelming evidence that lower speeds result in fewer collisions of lesser severity (Finch et al 1994, Taylor et al 2000, Transportation Research Board 1998). Some interesting conclusions can be drawn from research so far.

35. In any given situation, the faster the average traffic speed, the more collisions there are.

- Accident frequency rises disproportionately with increasing speed. It rises approximately with the square of the average traffic speed (providing the ratio of the standard deviation to the mean remains constant). For example, on urban roads a 21% increase in collisions could result from a 10% increase in mean speeds (Taylor et al 2000).

- Speeding or inappropriate speed contributes to a significant percentage of all crashes and a higher percentage of more serious crashes. Driver error is a contributory cause in over 90% of accidents: driving too fast is a driver error in judging what is safe.

- About a fifth of rural accidents involve vehicles going too fast for the situation with a further quarter likely to be associated with speed (Sabey 1993).

- In an urban area about 4% were directly related to excessive speed and another 21% due to speed related factors (Carsten et al 1989).

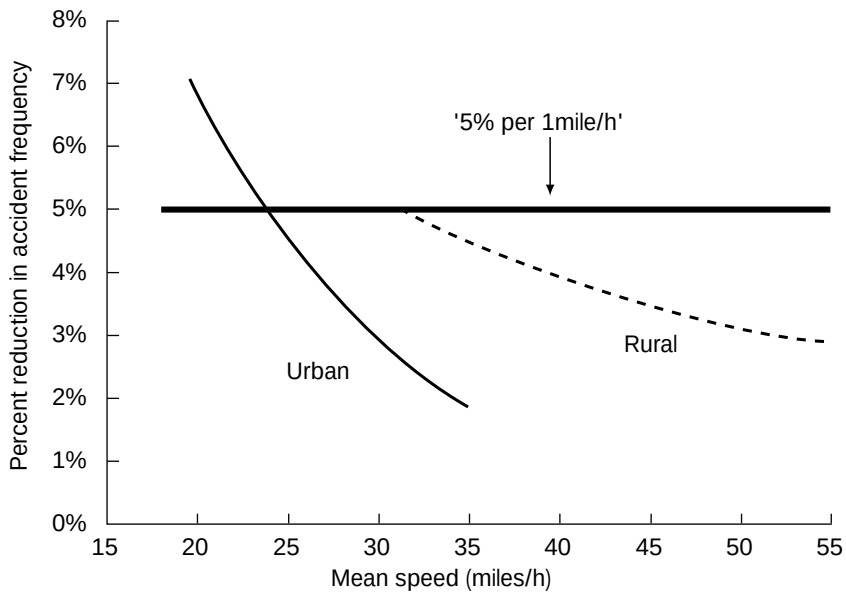
36. Broughton et al's (1998) work indicates that excessive speed was a contributory factor in 424 of the 2795 accidents studied (about 15%). But this is likely to be an underestimate. Speed will have been a part of the reason for other factors such as failure to judge another person's path or speed, which caused 623 of the accidents, about 22%. It is not possible to quantify these contributions directly.

37. New research (Taylor et al 2000) has examined the scope for reducing collisions through speed management. Broadly each 1 mph reduction in average speed is expected to cut accident frequency by 5%. This is a robust general rule, but now we have a much fuller picture which indicates that the reduction varies according to road type as follows:

- about 6% for urban main roads and residential roads with low average speeds;

- about 4% for medium speed urban roads and lower speed rural main roads; and

- about 3% for the higher speed urban roads and rural single carriageway main roads.



(source: Taylor et al 2000)

38. The greatest reduction in casualties would come from reducing the speeds of the faster drivers (Taylor et al 2000, see annex):

- if the proportion of speeders doubles, accidents go up by 10%;
- if their average speed goes up by 1mph, if all else is held constant accidents go up by 19%; and
- if an individual drives more than 10-15% above the average speed of the traffic around them, they are much more likely to be involved in an accident (Maycock et al 1998, Quimby et al 1999a and b – see annex).

39. From surveys of 800 English car drivers Stradling et al (1999) find that one in three of those drivers who had been penalised for speeding offences in the last three years had been involved in an accident as a driver in the same period.

40. Research also indicates that drivers scoring high as 'violators' on the Manchester driver behaviour questionnaire (see annex) are likely to speed and 'violate' other road traffic rules such as close following, red-light running, getting angry with other drivers, and drinking and driving. Stradling also proposes that 'violations' reduce safety margins so that there is less room or time to correct errors such that:

Violation+Error=Crash (Stradling 1999)

SPEED AND INJURY SEVERITY

41. The likelihood of being seriously injured in a collision rises significantly with small changes in impact speed. The impact speeds at which this increase is most pronounced are lower than most would think. The probability of serious injury to a belted car occupant in a front seat at an impact speed of 30mph is three times greater than at 20mph. At 40mph it is over five times greater (Hobbs and Mills 1984), see annex.

42. For pedestrians and cyclists the reality is even more stark. At-the-scene investigations of collisions involving pedestrians and cars or car-derived vans found that 85% of fatalities occurred at impact speeds below 40 mph (Ashton and Mackay 1979). This compared with 45% which occurred at less than 30 mph and 5% at speeds below 20 mph.

43. About 40% of pedestrians who are struck at speeds below 20 mph sustain non-minor injuries. This rises to 90% at speeds up to 30 mph, see annex. The change from mainly survivable injuries to mainly fatal injuries takes place at speeds of between about 30 and 40 mph (Ashton 1981). Elderly pedestrians are more likely to sustain non-minor injuries than younger people in the same impact conditions.

44. It is the combination of speed and lack of protection that makes motorcyclists vulnerable.

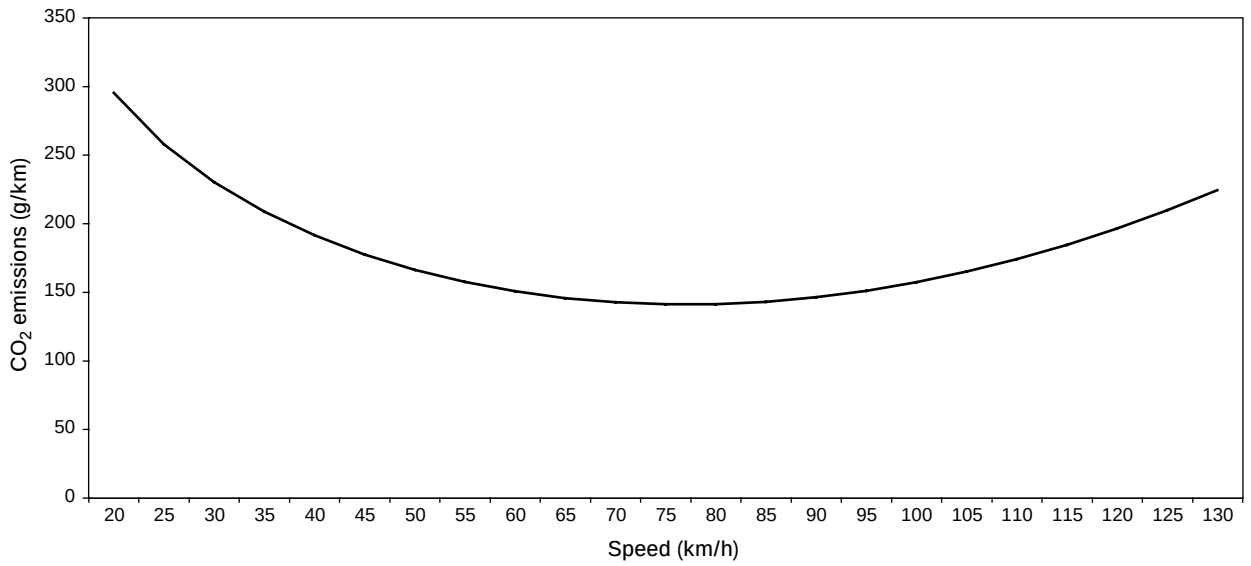
Vehicle speeds and the environment

45. There are direct relationships between vehicle emissions and speed. These relationships differ depending on the emission in question.

GREENHOUSE GASES

46. Carbon dioxide (CO_2) emissions are proportional to fuel consumption. At lower constant speeds total emissions of CO_2 are relatively high. With increasing speed these emissions decrease until a threshold of about 30 mph (50 km/h). Above this any increase in speed leads to a steep increase in CO_2 emissions. Driving style will also have an impact on this relationship. Hard acceleration increases emissions, and engine tuning is also a factor.

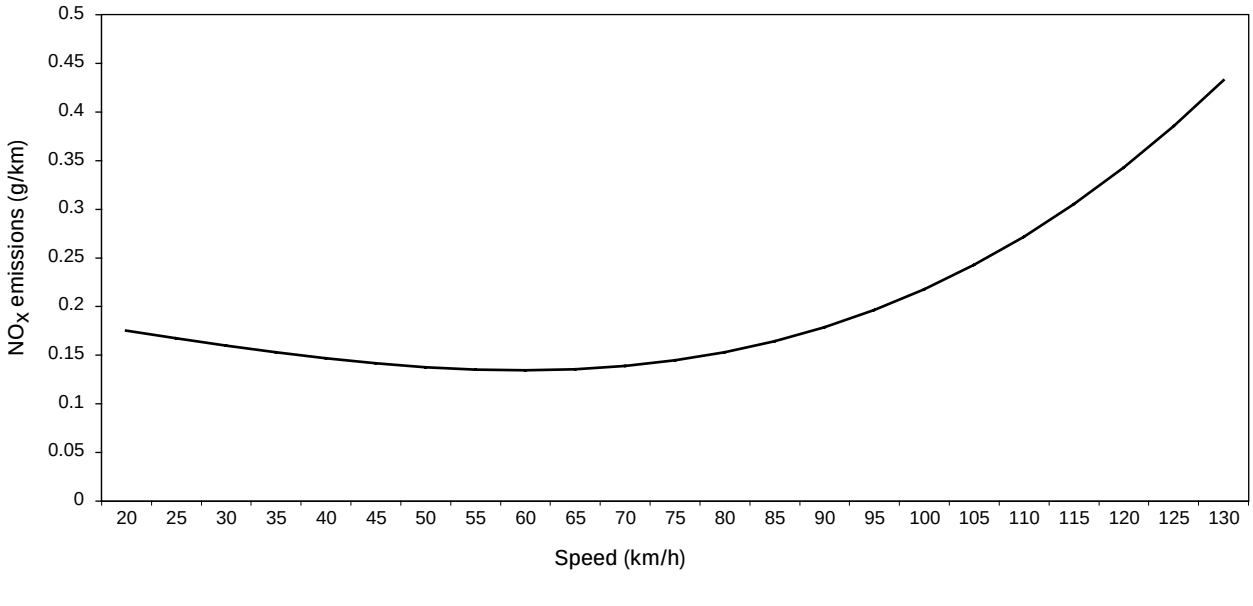
Figure A9: **CO_2 emissions from a Euro II petrol car relative to vehicle speed**



AIR POLLUTANTS

47. Production of oxides of nitrogen (NO_X) follows a different pattern from carbon monoxide or hydrocarbons. Emissions of NO_X go up as a vehicle's speed increases, with the greatest rate of increase occurring at higher speeds. So reductions in speed generally lead to reductions in NO_X. The effect is less important in urban areas as much higher speeds are unusual. Engine temperature and load are also relevant. For example, a car towing a caravan up a hill at 30 mph would be likely to emit more NO_X than the same car without the caravan on a motorway at 70 mph.

Figure A9: **NO_X emissions from a Euro II petrol car relative to vehicle speed**



48. The effects of speed on carbon monoxide, particulates and hydrocarbons are less clear but measures which increase frequent acceleration and deceleration produce an increase in these emissions and in fuel consumption in general (see annex). Measures designed to smooth the overall driving pattern have shown some benefits, but not as great as those which can be achieved for oxides of nitrogen. In some circumstances the changes in speed during a journey produce more pollutants than the steady state speed of the rest of the journey. We need more information about the output of pollutants at smooth slow speeds as opposed to stop-start congestion.

49. We are able to estimate the effects on air quality of any measure which reduces the total volume of traffic or changes the fleet composition. Schemes to reduce speed can also have some influence on traffic volume. There has been some research in this area and TRAMAQ, the traffic management and air quality study (Cloke et al 1998), is investigating further. Examination of road hump schemes shows on average some 25% of traffic may be diverted from traffic calmed areas.

NOISE

50. Noise from transport is a major concern for many people, especially for those who live close to fast or busy roads, or in inner city areas. There are three major sources of noise: the vehicle's transmission; the tyres in contact with the road; and loose bodywork.

51. Two of these are directly related to speed. Engine noise predominates at slower speeds. It is progressively being reduced as the effect of tighter noise standards for new vehicles works its way through the fleet, though this is offset to some extent by increased traffic volumes. Tyre noise becomes a problem at higher speeds (over 30-40 mph for newer cars). The EU has published proposals to establish noise limits for tyres in contact with road surfaces.

52. The road surface itself is becoming quieter and safer with new techniques and materials.

53. Traffic calming will generally reduce traffic noise because of the lower speeds, unless driving style is harsh.

The effect on quality of life

54. Speed of traffic affects people's quality of life, but these effects are difficult to quantify. Some people simply enjoy driving fast. For others, a shorter journey time means access to wider choice, for instance of places to work, shop or pursue sports and other leisure activities. In urban areas particularly, journey times can mean the difference between whether or not a trip is viable.

55. Of the disadvantages, injuries and noise are perhaps the easiest to measure. It is harder to pin down the effects that fear of fast moving vehicles has in discouraging people from walking, cycling and horse riding, or in limiting their enjoyment of or ability to reach facilities.

56. Long streams of fast traffic contribute to the severance of communities. This disproportionately affects those who find it difficult to cross fast roads, for example older people and children. In its most severe form this can increase inequalities and cause social exclusion in communities by making it more difficult to form support networks and, for those without cars, to get to necessary facilities, such as shops, schools and medical services (Department of Health 1998a, Health Education Authority 1988). The social price of speed, does not fall evenly. Levels of pollution and general public health are worse in inner cities and there are higher than average child road casualty rates in poorer neighbourhoods (Christie 1995).

57. At slower speeds there is a balance to be struck between road safety, an environment conducive to healthy activity and limiting damaging emissions.

Health

58. Accidents and pollution affect health. Speed contributes to both injuries in collisions and

harmful emissions. Particulates, carbon monoxide and hydrocarbons not only seriously affect the environment, but also the health of those breathing the air (see for example, Department of Health 1998b).

59. Physical activity is important in reducing heart disease and strokes (Department of Health 1999). If the effect of traffic speeds is to dissuade some people from walking and cycling, this could affect their health and general fitness.

The economy

60. Time savings are an important economic element in assessing the case for investment in roads or public transport. Measures which reduce maximum permitted speeds will increase journey times in many cases. Indeed, they will increase them in all cases where they reduce average speeds and so reduce road accidents.

61. For commercial and business users the costs of longer journey times can be measured directly in terms of wage rates and the capital tied up in the commercial vehicle fleet. For other transport users, there is a value for time savings established through a mix of survey techniques and observation of travelling behaviour.

62. We can show how policies on speed management will influence journey times using transport and traffic models, which are a mathematical representation of travellers' behaviour. Changes in journey times, combined with the values of time savings, give a measure of the economic costs for users and allow us to compare options. We can also estimate the effect on vehicle emissions from the same models.

63. Increasing congestion on urban and some inter-urban roads has made it difficult for drivers to estimate how long their journey will take. We are working on establishing a value for improving reliability. Some speed management measures might make arrival times more predictable, but we do not yet have a clear method of assessment.

64. The costs of speed management need to be weighed against the benefits. The greatest potential benefit is reducing road casualties. In common with many other countries, the UK assigns a value to a statistical life and to different categories of injury when assessing the case for investment in road safety improvements (DETR 1999b).

What people say and what they do

SPEED MONITORING

65. Almost all drivers and riders exceed speed limits at some time. The table below shows the results of speed monitoring on main and distributor roads (DETR 1999c). There is little information on the speeds actually being driven elsewhere.

Percentage of drivers exceeding the speed limit on different types of road

Road type	Cars	Motorcycles	HGVs
Motorways	55%	no data at present	few [1]
Dual carriageways [2]	54%	no data at present	79-93%
Rural single carriageways [3]	10%	no data at present	60-76%
40mph urban roads	26%	35%	7-16% (7% of buses and coaches)
30mph urban roads	69%	63%	more than 50% (41% of buses and coaches

Notes

1 Few HGV, bus or coach drivers should exceed maximum speeds if their speed limiters are set properly.

2 70mph limit for cars, 50 mph for HGVs.

3 60mph limit for cars, 40mph for HGVs.

66. Other relevant findings are:

- 19% of car drivers exceed 80mph on motorways and 14% on dual carriageways; and
- on rural single carriageway roads, 17-30% of HGVs exceed 50mph.

ATTITUDES AND BEHAVIOUR

67. Despite this evidence, when drivers are questioned:

- 84% say the speed limit in town should be broken only in exceptional circumstances;
- 58% say the same of motorway speed limits;
- 39% of self-confessed speeders favour a three month ban for people going 30mph above the motorway limit;
- 36% of them say the same of drivers doing 10mph over the residential area speed limit.

(Lex Motoring Services 1997)

68. Even so, drivers and riders often do not know what the speed limit is or understand the reasons for it (Silcock et al 1999). Many people do not regard breaking the speed limit as a criminal act.

69. In the absence of police enforcement, many drivers may not check the limit in force or their own speedometers. There is evidence that the greatest influence on the speed they drive is their perception of the road environment and what feels 'fast enough'.

70. But perception depends much on context. What feels right to the driver or motorcyclist often seems too fast for the same people when they are walking, cycling or when they are judging as residents of the area.

71. In a survey of 1,022 people asked their views on country lanes 65 percent said that they felt threatened by traffic either some or all of the time when walking, cycling or riding on these roads (CPRE 1999). The definition used of a country lane was those classed as C and unclassified roads in rural areas.

Deciding what speeds are right

72. The current national speed limits have developed over many years. They are set out in the annex along with the signs used to indicate them. On some roads, different limits apply to different classes of vehicle for safety reasons.

73. Local traffic authorities are free to change these limits if they feel that they are inappropriate for some of the roads which they cover. The DETR and Scottish Executive issue advice on setting local speed limits. The current advice is Circular 1/93 issued by the then Department of Transport in 1993 and in Scotland SOID Circular 1/93. They explain what to take into account when deciding the speed limit appropriate for a road. The circulars also advise authorities to monitor vehicle speeds where they have changed limits and advise them on measures to bring speeds in line with the new limit if they are too high.

74. Surveys of road safety professionals and drivers alike indicate that existing speed limits are not (in the drivers' view) consistently applied. Similar roads are given different limits, which encourages disrespect for speed limits and the law and is cited as a justification for speeding (Silcock et al 1999).

75. The current advice on setting limits is based on road safety considerations and does not cover the wider impacts of speed.

76. No formal assessment is made of the economic, environmental or social effects (including road safety) of any change in speed limits and vehicle speeds. No appraisal framework is tailor-made for such a task, although the DETR's new approach to appraisal (NATA) (DETR 1998) used for assessing road schemes shares the same objectives.

Current measures for influencing vehicle speeds

ENFORCEMENT AND PENALTIES

77. Speed cameras are particularly effective at reducing vehicle speeds. A Home Office research report shows that speeds at camera sites were reduced by an average of 4.2 mph and accidents by 28% (Hooke et al 1996). But their effectiveness is blunted by the cost of their operation.

78. DETR and other interested authorities are developing a pilot scheme for a new financial system which will allow the additional cost of camera enforcement to be funded from speeding fines. HM Treasury has set the rules for the two year pilot which will start in April 2000 in eight police force areas.

79. If the results are satisfactory, we will develop a system for the police, courts, local authorities and others to reclaim the costs of buying additional cameras, or increasing the use of existing ones, where otherwise no funding would have been available.

80. Even where they can be used fully, cameras should not be regarded as a panacea. Motorists tend to slow for cameras and increase their speed once past.

81. For speeding offences, the courts can:

- endorse driving licences by between 3-6 penalty points;
- disqualify drivers in the most serious cases; and
- impose a fine of up to £1,000 (£2,500 for motorway offences).

82. In addition to the offence of 'exceeding the speed limit' it is possible for speeding motorists to be charged with the more serious offence of 'dangerous driving' or 'careless and inconsiderate driving' (Section 1 & 2 respectively, Road Traffic Act 1991) where much heavier penalties could apply. On motorways, speeding is a higher category of offence than when it occurs elsewhere.

83. In practice most speeding offences are dealt with through the fixed penalty system where a driver is currently fined £40 and has 3 points added to their licence. A driver who gains 12 points or more is disqualified. New drivers with 6 points have their licence revoked.

TRAFFIC CALMING

84. Road humps, chicanes and other road engineering measures remain the most effective

method of reducing vehicle speeds in urban (and some rural) areas. They can reduce average speeds typically by 10 mph (Mackie 1998), and are particularly effective at reducing child pedestrian casualties. Schemes can be designed to encourage a smooth driving style to limit noise and emissions. There is no evidence that when negotiated at sensible speeds these cause damage to vehicles. But they cannot be applied everywhere, such as on major through-routes, especially if regularly used by the emergency services.

85. Road markings have been used to good effect for changing the nature and appearance of a road, and the speed at which people choose to drive. A good example is hatched centre line markings which can give the impression that roads are narrower. Research is currently in progress to see how road markings at bends could give better guidance to drivers.

86. The additional speed limit signing currently in use, such as countdown signs (placed at regular intervals before a limit), has had little effect on vehicle speeds. Carriageway roundels (speed limit signs painted on the road) have had some beneficial effect when used with upright signs at the start of speed limits. As repeater signs, they have not brought about significant speed reductions. It is difficult to see them at night or when they are wet or obscured. Both signs require approval before they can be used.

87. There are new types of sign which have shown real benefit. They are activated by individual vehicles approaching a hazard such as a bend or obscured junction above a set speed, or travelling above the speed limit. They may show the advised speed, or a sign indicating the nature of the hazard, or a road safety message (see for example Compte 1998, Farmer et al 1998). These vehicle-activated signs have proved effective at reducing vehicle speeds and collisions at certain sites.

88. The work of the countryside traffic measures group (CTMG) includes finding sympathetic traffic management measures for use in rural areas. So far it has been difficult to identify measures that are both effective and acceptable to local residents. The Scottish Executive is also researching into the principles of 'sympathetic' traffic calming.

89. Collisions on rural roads tend not to be concentrated at specific locations but scattered along sections of road. DETR-commissioned research indicates that accident rates per junction, per bend or per vehicle-kilometre might be useful ways to prioritise areas for remedial treatment. We give local traffic authorities accident rates based on national figures for different classes of rural road. They provide a benchmark for authorities to use as suggested intervention levels for their own roads (Barker et al 1999, IHT 1999). DETR will shortly be issuing advice on using the intervention levels.

EFFECT OF SPEED LIMITS

90. Speed limits on their own have little effect on vehicle speeds. In places where speed limits have been reduced and no other action taken, the change in mean traffic speed is observed to be about a quarter of the change in posted speed limit. For example, changing a limit from 40 mph to 30 mph tends to reduce speed by 2.5 mph (Finch et al 1994).

91. Experience from Suffolk indicates that casualties can be reduced by introducing county-wide rural speed limits. (Suffolk County Council 1997, Watson 1999). Some other counties are following suit, but there is no national guidance on what is an appropriate speed nor how it may be achieved.

92. Following changes in legislation in 1999, local authorities are free to introduce self-enforcing 20 mph zones and 20 mph speed limits where these are likely to reduce actual vehicle speeds and cut casualties.

93. Currently, the most effective way to reduce vehicle speeds to 20 mph or less is through engineering measures. Without traffic calming, reducing a speed limit to 20 mph has not been effective. It usually slows most vehicles by only 1 mph (Mackie 1998). In Scotland 75 pilot projects are testing the effectiveness of 20mph schemes which do not include traffic calming in areas mainly used by the people that live in them, and within little through traffic. The results are due in the Summer of 2000.

94. Graz, in Austria, had been progressively introducing 30 km/h (approx. 20 mph) zones with traffic calming for 10 years. But the waiting list for zones was increasing faster than they could be installed. In 1992, Graz decided to introduce a blanket 30 km/h speed limit on all non-through roads. The remainder kept their 50 km/h limits (approx. 30 mph). This was part of a local integrated transport strategy called 'gentle mobility' which aimed to promote walking, cycling and public transport and to limit car travel without interfering with business.

95. Intensive public awareness work and police enforcement accompanied the introduction of the lower limits. Public approval levels increased from less than half to over three quarters after four years.

- Casualties decreased by 12% city-wide.
- Mean speeds between junctions reduced by 0.5 km/h and at junctions by 2.5 (8%).
- 85% of traffic reduced speed by about 2 km/h at junctions and 1.6 km/h between them.
- The proportion of those travelling above 50 km/h fell from 7.3% to 3% with the new limit (Wernsperger and Sammer 1995).

96. But when enforcement stopped speeds gradually increased to near their previous levels.

HOME ZONES

97. Home zones, now common in many parts of Europe, originated in the Netherlands. They are usually an area of residential streets in which the road space is shared between motor vehicles and other road users, with the needs of pedestrians and cyclists coming first. The DETR is exploring the extent to which home zones can be implemented within existing UK legislation. The three year monitoring project covers nine local authority schemes in Ealing, Lambeth, Leeds, Nottingham, Manchester, Monmouthshire, Peterborough, Plymouth and Sittingbourne.

98. The Scottish Executive has announced it plans similar monitoring in Scotland.

SPEED LIMITERS

99. Speed limiters are already fitted to some vehicles to restrict their maximum speed. For example HGVs have governors limiting them to either 56 mph or 60 mph, depending on their weight. However, it is possible to keep speeds to the speed limit in force on any given road, rather than just the maximum speed possible. The technology is already available to detect speed limits using a digital map kept in the vehicle. The global positioning system (GPS) identifies the vehicle's location by satellites. These systems can be used to inform drivers of the limit, or they can link into an adaptive speed control system. But their general use, even if adopted, is some years away.

CHAPTER 3
Analysis

100. Analysis of the review's findings is divided into sections discussing:

- the effects of speed;
- the problems to be tackled in urban and rural areas and on motorways; and
- measures to achieve appropriate vehicle speeds.

101. Given the obvious conflicts, the analysis makes it clear that when improving road safety speed management policy for any given road will not benefit every objective of *A New Deal for Transport*. A balance needs to be struck. The new approach to appraisal of road schemes announced in the white paper provides a means of describing and often quantifying the benefits and drawbacks of policies to manage vehicle speeds.

102. Some policy options require further research and analysis before their effects on the economy, on safety, accessibility and the environment can be determined reliably and the results presented in the form that is now being used to appraise other transport projects and policies.

The effects of vehicle speeds

ROAD SAFETY

103. Speed is not the only factor in collisions. Many accidents have more than one contributory cause. DETR and the Scottish Executive are working to tackle other areas such as drink-driving, seat belt wearing, driver training, and pedestrian awareness. The road safety strategy, *Tomorrow's Roads : Safer for Everyone* explains the measures in detail.

104. That said, the speed review has confirmed the following points.

- Speed is indeed a major contributory cause of casualty accidents. Recent research has added greatly to our knowledge of where the problems are particularly acute (see para 35 onwards).
- Slowing the fastest drivers will yield the greatest safety benefits.
- In some areas quite small reductions in average speed would bring large benefits.
- Speeders are disproportionately involved in collisions (para 39).
- Those that drive faster than most on a road, or exceed speed limits even by relatively small margins greatly increase the risk to themselves and others.
- The higher speeds on any given road are associated with both more accidents and greater injury severity. This relationship holds for all drivers and not just the less experienced.
- The faster the speed at impact the more severe the resulting injury. This is particularly so for collisions with pedestrians, cyclists and motorcyclists, who are unprotected from the forces of impact unlike occupants of modern cars (para 42 onwards).
- Some people do not accept that speed is a problem. Even those that say they do, do not always act accordingly.

- Drivers often do not understand why speed limits are set as they are. In some cases it may not be clear to them what the limit is.

WIDER IMPLICATIONS OF VEHICLE SPEEDS

105. From the available evidence there are some very clear messages on the impact of speed on the wider objectives of integrated transport.

106. Air quality and noise are important in urban areas where the problems tend to be worse and more people are affected. Speed management aimed to improve road safety in urban areas may affect noise and air quality. Schemes should aim to minimise adverse effects.

107. Some measures to improve road safety can also improve air quality and noise levels. This is perhaps more so in rural areas where speeds are higher.

108. We need more work to establish the effect of traffic management schemes (like road humps) on air quality in order to produce clear guidance for decision makers (para 49).

109. At lower speeds, traffic calming may increase emissions of greenhouse gases and most air pollutants, but careful planning and design can minimise the effect on air quality (para 84).

110. Smooth driving without fast acceleration and deceleration is less polluting than harsh driving (para 46).

111. Speed management policies can help reduce noise originating from tyre contact with the road. Generally the higher the speed the greater the problem.

112. Better vehicle standards are cutting transmission noise. These improvements should not be counteracted by traffic calming schemes. When they are carefully implemented, the lower speeds usually result in less traffic noise.

113. Increases in journey times brought about by lower average speeds increase road transport costs for all users and especially business and industry (para 60 onwards).

114. There are other areas, particularly in relation to the impact on quality of life and suppression of alternative modes of transport, where we need more information to guide policy decisions. We also need a more thorough breakdown of how fast people are driving and riding on all the different types of road.

Urban speed management

WHAT SPEEDS ARE APPROPRIATE?

115. Most injuries occur in urban areas, although this is not the case for deaths (para 27). In free-flowing traffic the road safety evidence points to the need for slower driven speeds on most urban roads, particularly main roads. These account for half the casualties because of their mixed use by traffic and pedestrians. It is also here that there are the greatest air quality and noise problems. So, do we need changes in the speed limit, or would we achieve the required outcome if more people observed the existing limit?

116. The 30 mph speed limit has been with us since the 1930s. It is universally acknowledged and enjoys a great deal of support with few wanting an increase. About a quarter of people favour lower limits. This is at odds with the speeds of the majority of drivers and riders in free flowing traffic on many urban roads.

117. Some favour lowering the urban limit to 20 mph. Some favour reductions on certain classes of road only, most notably residential roads, those around schools, hospitals or similar areas. There is a strong road safety case for vehicle speeds closer to 20 mph in areas where the vulnerable, especially children and older people, are most likely be at risk. In key areas this would also support government policies for urban regeneration.

118. But if vehicle speeds were now lowered to 20 mph on all roads currently restricted to 30 mph, emissions of CO_2 and some air pollutants would

increase markedly (para 47 onwards). This would be unacceptable at a time when the government has a legally binding target to reduce greenhouse gas emissions and a domestic goal to cut CO_2 emissions.

119. The cost to the economy in increased journey times arising from generally slower speeds is also likely to be noticeable. Plowden and Hillman (1996) attempted to quantify time and cost penalties from enforcing lower speeds in urban areas. They conclude that much work needs to be done in this area of modelling, especially as the potentially positive effects on pedestrians, cyclists and on drivers entering the traffic stream from the side roads have not so far been included.

120. The aim in urban areas should be speed limits appropriate for the roads to which they are applied. On some the benefits of speeds as low as 20 mph will outweigh the disadvantages. On others a limit of 30 mph (if observed) will strike a suitable balance between safety and other considerations. Elsewhere an objective study may conclude that some 30 mph roads could safely sustain a 40 mph limit. These would need to be:

- areas where few pedestrians and cyclists could be expected; or
- where there is ample provision for all those that need to use the road safely; and
- there are no additional disadvantages in terms of vehicle emissions, especially noise.

ACHIEVING APPROPRIATE SPEEDS

121. This argues for local traffic authorities to target speed management in urban areas. They are in the best position to identify and treat problem areas. This approach would ensure that the full local impact of every scheme could be assessed.

122. Where speeds of 20 mph are necessary, self-enforcing 20 mph zones have proved very successful. All research to date into the relationship between speed limits and vehicle speeds points to 20 mph limits being relatively ineffective without traffic calming (see para 94). So self-enforcing zones should continue to be the norm. There is still plenty of scope for installing them. We do not have traffic calming around the majority of schools for example.

123. Within town centres and other areas with a mixture of land uses, planning guidance already recommends that priority should be given to people over traffic. Well designed pedestrianisation schemes generally prove popular and commercially successful, and local authorities should consider traffic calming and reallocating road space to promote safe walking and cycling and to give priority to public transport.

124. All speed management schemes should be designed to be sympathetic to their surroundings and, wherever possible, used to enhance an area aesthetically. This would be in keeping with the government's aim to make cities and towns desirable and attractive places to live. But traffic calming must be conspicuous to be effective and it is likely to prove challenging to produce entirely sympathetic designs.

125. We need continued research to find ways to encourage drivers to reduce speeds without engineering measures. The most pressing need is to make drivers comply with existing speed limits.

126. We need other research too, to help develop our national speed limit policies. One example is that speed monitoring data tends to cover only main and local distributor roads. Details of the speeds driven (and therefore the extent of the problem) elsewhere is scarce.

127. More work needs to be done to:

- establish the range of vehicle speeds across the whole urban network;
- identify where excessive and inappropriate vehicle speeds are a road safety problem; and
- identify and develop measures to achieve appropriate speeds, especially in areas where we cannot use traffic calming. We need to work with local traffic authorities, particularly on assessing costs.

128. To summarise: in urban areas we believe that, in general, the problem is that drivers exceed the current speed limit rather than that the limit itself is too high. Where a 20mph limit is needed, to be effective it should be self-enforcing.

URBAN SPEED LIMIT SIGNING

129. The national speed limit of 30 mph (the restricted road limit) is applied by law to any road in England and Wales with a system of street lighting in which lights are no further than 200 yards (183 metres) apart. Exceptions are where a local traffic authority has applied a different limit.

130. In Scotland the limit only applies to Class C and unclassified roads with lighting no more than 185 metres apart.

131. Signs are required to show the start and finish of the limit, but repeater signs are not permitted on these roads. This is because of a legal ruling that repeaters on some roads and not others can make drivers uncertain of the speed limit in force.

132. At first sight, this would seem a rather odd way of indicating a limit. But in practice it has the merit of simplicity: if there are street lights and no signs to the contrary, then the speed limit is 30 mph. It is difficult to find an alternative way of defining these areas in law. Other legislation tends to define 'urban areas' as those with a 30 mph speed limit.

133. Sometimes people claim the absence of repeaters is a reason for speeding. We accept some 30mph roads might look to motorists as though they would have a higher limit. We might need legislation to reverse the long standing principle and permit repeater signs on such roads.

134. It would be wise for local traffic authorities to assess whether the speed limit is appropriate before installing repeaters under any new powers. It is unlikely to be acceptable to insist that vehicles travel at 30 mph on, say, a dual carriageway just because there are street lights. Repeaters would not affect driven speeds.

Rural areas

STRATEGY FOR RURAL ROADS

135. At present the problems on rural roads mostly concern vehicle speeds that are within the current limit but inappropriate for the conditions. So, does the speed limit need to be lowered or does the solution lie in the use of other measures?

136. The national speed limit on single carriageway roads in rural areas is 60 mph for cars and motorcycles. A number of influential groups call for reduction in this limit on all the roads to which it applies. Most prefer a new limit of 50 mph. Others would like to see an even lower limit, or additional limits applied to different types of rural roads. Other groups oppose any reduction.

137. It is clear that we need a consistent strategy for managing vehicle speeds on all rural roads. There is general agreement that co-operation between the highway authority, local people and the police is required – and the implementation of the new IHT guidelines for rural safety management (IHT 1999) – is necessary to achieve this. The current classification (A, B, C and unclassified) would not offer a complete solution because the classifications were developed to define direct routes between main destinations rather than to describe the quality of the roads.

138. In the longer term the goal should be to develop a method of defining a road hierarchy for speed management purposes. This would benefit urban as well as rural areas. More immediate solutions will need to be found.

139. For the purposes of the review, we divide rural areas into three categories: main roads; villages; and country lanes. These are generalisations. Reality is a lot more complicated.

MAIN ROADS IN RURAL AREAS

140. Where rural single carriageway roads are concerned, discussion about speed limits tends to focus on the national speed limit of 60 mph for cars

and motorcycles. This is relatively well observed compared with other limits (para 65).

141. There is a case for reducing the national speed limit and retaining a higher limit on better quality roads. There is a substantial cost involved in this option because we would have to advise motorists of any new speed limit in force, either through sustained national and local media campaigns, or by changing the speed limit signs on all the roads affected. So, would the benefits outweigh the costs or would it divert resources from more effective solutions?

142. The safety problem on these roads is clear. Many collisions are the result of either overtaking or of driving too fast to negotiate a hazard like a bend or junction (Barker et al 1998). The victims are mainly drivers and passengers. The research results so far indicate that better control of vehicle speeds at hazards such as bends and junctions would be a more effective way of reducing casualties on rural main roads than a reduction in the national speed limit (Taylor et al 2000). Fortunately the relatively low cost technology to do that has been developed. Sensors which detect vehicles approaching too fast and give the driver a warning sign (para 87) are being tested in Norfolk.

143. Looking at wider objectives the priorities must be:

- to make other road users feel safer; and
- to improve the quality of life of people who live in or visit rural areas.
- Noise is less of an issue as there are generally fewer people affected.

144. The solution is not straightforward. How much more slowly would vehicles need to go to make other road users feel safer? We do not yet know whether cutting vehicle speeds to 50 mph (or even 40 mph) would be enough to encourage walkers, cyclists and horse riders to use such busy roads more, even if there were provision for them. We need to study some local projects to find out.

145. If we could assess the best speeds for these roads, there is still the question of how to bring vehicle speeds in line with it. There is evidence that drivers are confused about the national rural speed limit. The nature and appearance of the road is one of the strongest influences on how fast people drive, and therefore the speeds currently driven on rural roads. If a lower speed limit were imposed without any additional speed management measures, drivers attitudes would have to change for there to be a general reduction to the new limit.

146. On balance it seems sensible not to make blanket changes to the national speed limit at present. Instead, local authorities should develop speed management strategies, taking into account national guidelines and local conditions. Some local authorities have already decided to reduce limits on many of their roads. There will certainly be some further speed restrictions as well as measures at hazardous locations. The advice we plan to issue on intervention levels (para 89) will help local targeting.

147. There is a growing consensus that the sign to show that the national speed limit applies (see annex) is misleading, or at best not properly understood. In part this may be because the meaning of the sign has changed since it was first introduced to show the road was ‘de-restricted’. We need to find a more effective method of informing drivers of the speed limit on these roads.

VILLAGES

148. There are three questions relating to villages:

- how should they be defined;
- how can we make sure vehicle speeds are not too high; and
- are the measures available acceptable?

149. High vehicle speeds severely disrupt rural communities. In villages, fear of traffic can affect people’s quality of life. The case for some bigger villages to have the same speed limit as similar roads in urban areas is self-evident. We believe it should be regarded as the norm. But a speed limit does not necessarily reduce vehicle speeds in line. Drivers cannot be expected to respect limits nor

understand the reason for them if they are seen to be arbitrarily applied or gradually encroaching on higher quality roads into the countryside.

150. Before a national speed limit could be applied we have to reach agreement as to what constitutes a village. Some settlements are very small. Arriving at a workable definition will take local consultation, as well as research and discussion at a national level between departments and local authority associations.

151. Some form of traffic calming is usually required to reduce drivers' speed through villages. People who want lower limits often dislike these sort of measures and even dislike the signing required to tell motorists what the limit is. So there is a conflict to be resolved. Some local authorities have now taken the decision to lower speed limits in all their villages and we will want to see how well they fare.

COUNTRY LANES

152. The one aspect of the national speed limit system that comes in for most criticism is the notion that 60 mph is a reasonable maximum speed on country lanes.

153. On single track and narrow roads such high speeds are clearly not desirable, and often not achievable. On such roads any speed limit is academic. The threat of prosecution for the offences of dangerous driving or driving without due care and attention might be a better deterrent against bad drivers.

154. On country lanes, the speed limit is only relevant where it is possible for drivers to break it and where the appearance of the road leads them to do so.

155. It is often suggested we set a lower national speed limit for these roads. But how could they be legally defined? What constitutes a country lane? Given that signing is such a sensitive issue in the countryside, how would we make the limit clear to drivers? These questions are yet to be answered.

156. We need more information before we can properly assess the case for a lower national speed limit. In particular research needs to establish what the vehicle speeds are on these roads, and the effect they are having on walking, cycling and horse riding. Without this knowledge, it is not clear what the limit should be or what effect it would have on how fast people drive, given significant police enforcement is unlikely. Again, some authorities have already established lower speed zones and we will learn from their experience.

157. So, at the moment it makes sense only to treat the roads where local authorities can identify that problems exist, using lower local speed limits where needed. Elsewhere, it is not a problem if the national speed limit is higher than the speeds people can actually drive. Resources should not be spent on a road if speeds are effectively restricted by its nature. There is clearly a need to explain this approach. Having done so it should not affect the goal of gaining respect for limits as a whole. Arguably, this is most likely to be jeopardised by limits that are set too low.

Motorways and dual carriageways

158. From a road safety perspective the most dangerous aspects of dual carriageways and motorways are:

- congested periods;
- the points where drivers join and leave them; and
- speed through road works.

159. In free-flowing traffic, strategies for these roads will still need to take account of environmental and economic objectives.

160. On motorways the accident rate is good compared with other roads. This is because they are of a consistent and high standard. Vehicles travelling in different directions are segregated and the most vulnerable of road users are prohibited.

161. There are strong views on the present motorway speed limit of 70 mph. It is broken by 55% of car drivers. It is not practical to enforce it everywhere. So there is some pressure to raise it to 80 mph, although many professional groups, including the Association of Chief Police Officers and the AA, do not support this view.

162. There is convincing evidence from the USA that where some freeway speed limits have been raised and vehicle speeds increased there have been more casualties (Farmer et al 1999). It is not certain what the effect would be here, but it is at least likely to be the same, especially if motorists were to break the new limit by much. Any rise in the speed of the faster vehicles would increase the differential between them and the slowest (HGVs mostly).

163. There is no doubt that any increase in vehicle speeds would increase emissions of CO_2 and NOx, and generate more noise. Decreased speeds would have economic effects through increased journey times.

164. But lower speeds do not always increase journey times. The controlled motorway project being trialled on the M25 (see annex) appears to benefit drivers by smoother traffic flow and more reliable journey times.

165. In free-flowing conditions on motorways and dual carriageways we believe that the current speed limits strike the right balance between the competing priorities. The problem lies in gaining compliance.

Achieving appropriate vehicle speeds

166. Deciding what speeds are appropriate is one thing, achieving them is another. This section discusses the merits of current measures and future initiatives.

A STRATEGY FOR SETTING ROAD SPEED LIMITS

167. Ultimately the goal for speed management policies must be for drivers to take responsibility for their own actions and abide by speed limits. For limits to be respected they not only need to be appropriate for the road, but also to be understood. Inappropriate limits are often ignored and make drivers less willing to comply with the system generally.

168. Speed limits can be set nationally or locally. There are advantages and disadvantages with both systems. Simplicity is a major benefit of a national speed limit: it is applied to all roads of a particular type. There is, though, a great variation within categories such as rural single carriageways and urban roads. This leads to inconsistencies.

169. Local traffic authorities have powers to change any speed limit on their roads. Despite national advice, drivers and riders can experience different speed limits on similar roads depending on the part of the country in which they are driving. This in itself can lead to disrespect for the system. We need policies that ensure consistency as far as possible throughout the country. It will not be easy to achieve: councils have to react to local pressures as well as professional advice. The decisions must remain local.

170. Consistency is extremely important. If public perception is that speed limits are wrong or set at the whim of the local authority this will make it particularly difficult to change attitudes to speeding through education and publicity. Enforcement and penalties would appear unduly harsh.

171. Another difficulty for local traffic authorities is the time and cost involved in making individual speed limit orders. A simplified method of applying limits locally would help. Local authorities would benefit from the power to translate speed management strategies more easily into speed restrictions.

SPEED MANAGEMENT MEASURES – BENEFITS AND LIMITATIONS

172. The majority of current speed management measures are very effective on certain types of road (see para 84). There is scope for applying some measures such as road humps and 20 mph zones more widely, where their benefits outweigh any disadvantages.

173. Speed cameras are not being used to their full potential because of the cost of operating them (para 77). If the funding problem can be overcome, more cameras should be used to cut collisions. Cameras already in place could be more effective if the trigger speeds were reduced to those recommended by the police.

174. With the exception of the controlled motorway experiment, speed cameras are used only where they can improve road safety. This should remain the case, if we are to keep public support.

175. Signing and road markings are the areas where we have the least success at the moment. Longer term they have the most potential. On its own, extra signing such as carriageway roundels, countdown signs, or additional repeater signs has only a small effect on vehicle speeds. Evidence from The Netherlands suggests that a co-ordinated approach to this kind of signing may be more effective. It could be an answer to the problem that some roads by their appearance give motorists the impression that it is safe to drive at a speed higher than the limit in force.

176. Ideally, drivers should themselves choose to drive at the speed which safety, environmental and social reasons would dictate. Road design, including signing and marking, should help them. We need more information about which features most influence drivers' choice.

SPEED LIMITERS – VEHICLE CONTROL

177. As a longer term measure adaptive speed limiters (para 99) offer three potential benefits, to:

- advise the motorist when the limits change;
- allow the motorist to stop themselves going beyond the limit; and
- prevent the motorist from exceeding limit.

178. There is significant potential for casualty reductions. Findings suggest collisions could drop by 20% if all vehicles kept within present speed limits (Carsten 1999). Not only would a mandatory system prevent speeding, it would also allow variable speed limits in bad weather or at night, and lower limits at hazards like junctions and bends – this could result in a 35% reduction in collisions. It would free the police and the courts to concentrate on other offences, and deliver huge savings in casualties, emissions and the cost of enforcement. It might also be possible to increase some limits in the knowledge that they could be enforced.

179. But there is a big question about the acceptability of this equipment to the public. It would also be some time before it could be introduced on all vehicles. Performance requirements for the equipment would have to be established. Vehicle construction standards are governed by EU regulations, which could affect any requirement for vehicles to be fitted with such equipment. Discussions have started on producing performance requirements for manufacturers who might wish to offer this technology.

180. The best way ahead is likely to be for interested manufacturers to offer the equipment to customers as a way of staying within the law. If a significant number of motorists take up fitment voluntarily, a future administration could consider making it mandatory.

BENEFITS OF BEHAVIOURAL CHANGE

181. Speed limiters have their attractions, but it would be much better to persuade drivers to change their behaviour. If we are to reduce the need for traffic calming and enforcement, and particularly to moderate speeds in remote areas, individual drivers need to take responsibility for their own actions. It would benefit both safety and the environment.

182. But speeding is endemic. The monitoring results (table, para 65) show it.

183. We must explain properly the risks of speed and the reasons for limits and persuade drivers to pay attention to them. Perhaps there are better ways than roadside signs and speedometers to remind drivers what the limit is and how fast they are going. We must also try to explode some of the mistaken beliefs: experience, vehicle improvements, or empty roads at night do not make speeding safer. We must shift public attitudes and persuade drivers to behave responsibly all the time, not just when they think they might get caught.

184. There are deeper forces at work. There is a cachet attached to driving fast. It is seen as 'macho' which indicates that social and cultural norms are playing an important part in speed choice (Silcock et al 1999). There is evidence that drivers' perception of their own skill and ability affects the speed at which they drive. Some people also believe that driving faster somehow sharpens their senses and makes them more alert. Some of these claims were once made about drink-driving, now regarded as irresponsible by the vast majority.

185. Limits are still going to seem too low to some drivers, even if better and more consistently set than they are now. Advertising campaigns will play a big part in changing attitudes and behaviour. Publicity will also be required to educate drivers about the need for limits for all road users, not just themselves, and the reasons why they are set at certain levels.

186. The "Kill your speed" campaign has raised awareness of the issue of speed. Whilst it is well recognised, the indications are that drivers do not understand clearly enough what they should do in response. We need to address this.

187. Linking insurance premiums in part to speeding convictions may help raise awareness of the danger with motorists, providing an additional reminder of the link between speed and collisions. Insurance companies currently view speeding offences as a symptom of the problem of poor driving, rather than including these offences in their risk assessment. Given the evidence of the important part speed plays in collisions this may be an area where the industry could make voluntary changes.

ENFORCEMENT AND PENALTIES

188. We would prefer people to observe speed limits without a police presence, but enforcement is important in speed management. Both enforcement and penalties should aim to prevent re-offending.

189. The Crime and Disorder Act (see annex) will assist speed management policy

190. Fear of penalties can be a potent deterrent, but only if it is not seen as an empty threat. It is unrealistic to expect enforcement everywhere, especially in remote rural areas.

191. It is also important that enforcement is seen to be for a good reason rather than as a form of revenue collection

192. For the foreseeable future it is impossible to operate a system of 'zero tolerance'. We have to allow for the accuracy and calibration of detection devices. We would also wish to maintain the principle of giving people a fair chance to stay within the law.

193. This suggests we should retain the current enforcement thresholds advised by the Association of Chief Police Officers' (ACPO) in England and Wales and the Lord Advocate in Scotland. But the message to drivers should be to drive within the speed limit, rather than at the threshold for enforcement. That leaves no margin for error and could end in prosecution – or in killing or injuring someone.

194. Given the link between speed and accidents, we question whether drivers should be able to run up as many as four fixed penalty offences before they are disqualified.

195. Motorists who grossly exceed speed limits greatly increase the risk to both themselves and others. The evidence suggests that much tougher penalties are required for such an offence. The system should punish the worst offenders more

seriously. The present statute which regards motorway speeding as worse than speeding on ordinary roads is not supported by the evidence of risk.

196. All the current penalties for speeding aim to deter drivers through the cost of being caught, whether that be financial loss or loss of mobility. Arguably, drivers do not associate this sort of penalty with a dangerous or serious criminal act. Surveys undertaken by Corbett et al (1998) indicate that fines at current levels are unlikely to deter the fastest drivers and that more points, heavier fines and a high risk of detection would be needed.

CHAPTER 4
Recommendations

Overview

197. Too many people take a cavalier attitude to speed. Yet speed is a contributory factor in about one third of all collisions. Every year excessive and inappropriate speed helps to kill around 1,200 people and to injure over 100,000 more. It is by far the biggest single contributor to casualties on our roads.

198. Vehicle speeds are also a factor in air pollution, emissions of green house gases and noise, all of which affect people's health and quality of life. Changes in vehicle speeds can affect the economy in a number of ways.

199. Most of our current speed management policies are effective. Selective traffic calming and police enforcement should continue. The challenge is how to get the right speeds over the whole network rather than at isolated sites. We need the co-operation and understanding of drivers and their respect for the system of speed limits.

200. This strongly argues for a national framework which encourages consistency across British roads whilst allowing local traffic authorities flexibility to:

- make sure the limit is right for the individual road; and
- to take into account all local considerations which might be affected.

201. From this foundation we could work to change drivers' attitudes and behaviour through education and publicity campaigns and, for those that refuse to heed the message, enforcement and penalties.

202. We need a strategic approach to speed management that:

- considers how different measures can complement each other;
- takes account of its contribution to wider planning and transport objectives; and
- sets a clear and consistent context for it in regional and local transport strategies.

203. It must also take far more account of the road user than it has up to now. It is no good having excellent speed management schemes if the driver is unconvinced by them.

Action plan

204. We propose that the Government:

- develops a national framework for determining appropriate vehicle speeds on all roads, and ensuring that measures are available to achieve them;
- publicises widely the risks of speed and the reasons for limits;
- researches a number of speed management problems to develop and test new policies; and
- ensures that policies take account of environmental, economic and social effects when assessing their ability to reduce casualties.

SETTING THE RIGHT SPEED LIMITS

205. We do not recommend blanket changes in national speed limits. But we should revise our guidance on setting local limits to achieve appropriate, consistent standards across the country which reflect, as far as possible, the needs of all road users. We suggest the use of a methodology based on our new approach to appraisal of road schemes to ensure that when limits are set for road safety purposes the wider impacts are also assessed. The guidance would cover sensible measures local authorities should apply to achieve appropriate vehicle speeds.

206. We suggest the development of a simpler method of making speed limits by reference to a speed management strategy (para 171). It would work in much in the same way that structure plans look at strategic planning. We should also encourage local authorities to target speed-related accident sites.

New hierarchy

207. An additional hierarchy of roads defined by function (para 138) would help in setting speed limits and would improve consistency if variations were kept to exceptional circumstances. We recommend it as a long term measure, and would develop it in conjunction with local traffic authorities. The hierarchy would categorise roads as far as possible into those whose primary function is:

- the movement of people and goods by vehicle;
- for people to move safely on foot or bicycle; and,
- to cater for both on mixed priority roads.

208. We should take account of the *Rural Safety Management Guidelines* recently published by the Institution of Highways and Transportation (IHT 1999), the *IHT Guidelines for Urban Safety Management* (IHT 1990), and the joint paper *Rural Road Hierarchy and Lorry Routing* published in 1997 by The Scottish Office and CoSLA which all include advice on the development of additional hierarchies for urban and rural roads.

209. The development of a new hierarchy should be timed to tie in with local authorities' development of future local transport plans.

PROVIDING BETTER INFORMATION

210. We suggest the provision of better information to help drivers, including:

- more effective speed limit signing;
- vehicle activated signs at hazards;
- additional signing for speed cameras; and
- using driving tests and training to give novices better appreciation of what is a safe speed.

ROAD DESIGN

211. We believe there would be real benefit in designing roads which clearly indicate by their appearance the speeds which are appropriate. We recommend research to find what aspects of the road environment have most influence on the speed drivers choose. It will help us develop design principles for new roads and assess both the changes existing ones need and the practicality of modifying them.

HIGH SPEED ROADS

212. On motorways and dual carriageways the safety record is significantly better than on other types of road. It could be better still, and we suggest looking at ways to improve compliance with:

- the 70 mph limit, especially on sections where we know traffic speeds are excessive, increasing the risk of casualties; and
- lower limits in force for road maintenance or traffic management.

213. Retaining the 70mph limit would strike a balance between considerations of safety, the environment and noise on one side, and the economy on the other (para 158 onwards).

214. We recommend continuing to develop and monitor schemes similar to the controlled motorway system (see annex) where they can benefit motorists and make the best use of the network. We should also develop measures to tackle the problem of collisions at the points where vehicles leave these roads for other less well engineered areas.

URBAN AREAS

215. It is not appropriate to lower the 30 mph limit on all the urban roads to which it applies. Local traffic authorities already have effective measures to treat problem areas. This approach allows them to select measures after full consideration of their impact on quality of life, the economy and environment, and noise levels as well as road safety and mobility.

216. There is a very good case for lower speeds in some places, such as residential areas where the most vulnerable road users are. We should encourage local authorities to reduce vehicle speeds to 20 mph where this would be appropriate for road safety and urban regeneration. Self enforcing 20 mph zones are currently the only effective method of achieving this. We should continue to support authorities with guidance on implementation, especially in support of local casualty reduction targets.

217. High streets with mixed traffic and diverse use present a unique combination of problems. On some of these roads, speeds around 20 mph would be in line with government policies to reduce accidents and assist urban regeneration. We suggest developing and testing practical measures to acheive these speeds and reduce pedestrian accidents.

218. At the same time, we should continue to develop and encourage additional measures for roads which are not suitable for traditional traffic calming. We should also encourage increased use of speed cameras in urban areas at sites where they can improve road safety.

219. We should continue to encourage and disseminate best practice in urban safety management which includes main streets and traffic management schemes as well as residential areas. DETR's Gloucester 'safer city' project will produce guidelines in due course. We recommend consideration of whether further demonstration projects should be conducted.

220. We should consider allowing repeater speed signs on some restricted roads in exceptional cases (para 129 onwards). Local traffic authorities should review whether the speed limit was appropriate in the first place before exercising this power.

221. We should continue to develop and evaluate home zones.

RURAL ROADS

222. On rural roads we recommend:

- developing consistent speed management strategies with local authorities and others;
- working towards 30 mph being the norm for villages; and
- looking at whether 'country lanes' can be defined for speed management purposes.

223. We suggest the development of advice for local authorities on intervention levels for rural roads. It would help them identify areas that need treatment and to target their resources most effectively (para 89).

224. In rural areas many people are concerned about the speed of traffic, but it is unclear in some places precisely what the problem is or how to allay these fears (para 140 onwards).

225. On parts of the rural network, for example some country lanes, lower vehicle speeds are necessary. Lower speed limits may be appropriate, but other measures would be required to slow traffic significantly.

226. Drivers must be informed of changes in speed limit along a road and of traffic management measures ahead. The current signing is not always acceptable in rural areas. We need more studies to develop policies further.

227. We therefore recommend research to establish:

- where changes in speed offer most benefits on the rural road network;
- how to achieve appropriate traffic speeds sensibly and effectively; and,
- what safety, economic, environmental and wider benefits might result.

228. We will monitor the work of the countryside traffic measures group to help develop traffic management measures for rural areas that are sympathetic to the character of the area. The measures must also be acceptable to the local community and maintain accessibility and viability of local businesses as well as achieve the required results of reduced speed, environmental and safety improvements. We will keep local traffic authorities informed of what we learn from this work.

229. We recommend issuing guidance on vehicle activated signs. They have proved effective at reducing speeds at specific hazard points (para 87).

230. We should look at new ways of making rural speed limits clear to drivers and riders, either through education and publicity or by new signage. One model that should be investigated is using village name signs to denote the boundaries of an area speed limit as in France (see annex).

DRIVER EDUCATION AND TRAINING

231. We are reviewing our approach to driver training and testing. We are encouraging a more structured approach to learning so that novices better appreciate the responsibilities that come with the skill they are acquiring. We are also researching the practicalities of introducing a hazard perception test with moving images into the theory test. It could help assess whether a driver appreciates what is a safe speed.

232. Future publicity should target specific areas as well as generally warning drivers and others of the dangers of driving too fast.

233. We recommend looking to experience elsewhere for ways to refine our methodology. For England and Wales one example is the 'Foolsspeed' campaign running in Scotland. The initial publicity aims to challenge drivers' beliefs about their speed and driving ability.

234. We should look at fresh avenues to spread the message. For example, we are already talking to the Association of British Insurers about the results of the research described in this report (para 187).

235. We recommend researching the best ways of making sure motorists know what is the speed limit in force.

ENFORCEMENT AND PENALTIES

236. For those who refuse to modify their speed voluntarily we should seek to change their behaviour through enforcement and penalties. Actions should include:

- reviewing penalties to make them more effective, particularly for the worst offences;
- evaluating new enforcement technology; and,
- developing a new financial system using part of the fine revenue to repay the operational and administrative costs of speed cameras to the police, courts and local authorities.

237. Speed cameras will continue to be a way of using police resources to best effect. We recommend:

- more intensive use at existing sites;
- more cameras at new sites with either a history of speed related collisions, or where there is a known speed related problem; and,
- reducing trigger speeds to those in the guidelines issued by ACPO and the Lord Advocate.

238. A pilot scheme starting in April 2000 will be testing a new funding mechanism to allow fine revenue to be used to cover costs of speed camera operation (para 78).

239. With the exception of traffic management, speed cameras will should be used only where there would be road safety benefits.

240. Bans for speeding are often seen as short, and fines low compared with some other offences. Magistrates in England and Wales have guidelines on how to assess appropriate penalties. In collaboration with the Home Office and other departments, we recommend continued dialogue with the Magistrates' Association to keep up-to-date with their sentencing for speeding offences.

241. The Home Office is leading an urgent review of penalties for road traffic offences. This will determine the best way to make penalties for speeding more effective (see para 196). For example, the higher level of offence of speeding on motorways (para 82) does not reflect the relative danger. So there appears to be a case for increasing the maximum penalties on other roads to the same level. This will send a clear message of the seriousness with which the offence is viewed.

242. The Home Office review will also address how to punish people who drive far in excess of the speed limit. One option is to create a new offence. The review will also look at the penalty points system and whether persistent offenders could be deterred by the threat of losing their licence.

243. There are other ways the criminal justice system can educate offenders and deter speeding rather than just punishing after the event. The success of rehabilitation courses for drink drivers, and of pilot driver improvement schemes (see annex) suggests that a similar approach might work for habitual speeders and people who lose their licence for speeding. We should investigate the feasibility of schemes, possibly linked to a re-test before the licence is returned.

LONGER TERM MEASURES

244. The UK is in the forefront of developing technology for adaptive speed limiters (para 99). We recommend participating in European discussions to maintain our position and to influence the development of policy. We should look to develop a standard with our European partners. We should also aim to refine the system with a view to introducing it in the longer term. We will need to study the legal and administrative barriers to be overcome.

245. While engineers develop and refine the system and, internationally, we discuss the necessary changes to vehicle standards with motor manufacturers, we recommend public debate with motoring organisations about the costs and benefits.

A NEW APPRAISAL FRAMEWORK

246. Appraisal identifies the main effects of a policy or investment proposal on the overall objectives for transport policy, including safety, the economy, the environment, accessibility and contribution to better integration. The Scottish Executive has recently published the results of its strategic roads review along with details of its approach to appraisal. In England a new approach to appraisal was drawn up and used to select those road schemes to take forward as part of the 1998 roads review. We have since made some modifications to the way the results are presented to assist appraisal of public transport schemes and measures which affect cycling and walking. This framework will allow DETR and local authorities to assess the full implications of speed management schemes.

247. We need further research to identify the effects of many of the options for speed management described in this paper. The consequences of any proposal for safety, local air quality, journey times, emissions, noise, health and quality of life will differ according to local circumstances. We should provide advice on how to estimate these impacts and compare different options for managing vehicle speeds. It will help decision makers reach a well-founded conclusion on which options they should choose.

CHAPTER 5
References

Andersson G. and Nilsson G (1997) Speed management in Sweden. Linkoping: Swedish National Road and Transport Institute VTI.

Ashton S J (1981) Pedestrian injuries: the influence of vehicle design. In H.C.Foot et al (eds) Road Safety Research and Practice. Praeger.

Ashton S.J. and Mackay G.M. (1979) Some characteristics of the population who suffer trauma as pedestrians when hit by cars and some resulting implications. 4th IRCOBI International Conference, Göthenborg.

Barker J., Farmer S., and Nicholls D. (1998) Injury accidents on rural single-carriageway roads, 1994-95: an analysis of STATS19 data. Transport Research Laboratory TRL Report 304, Crowthorne.

Barker J., Farmer S., and Taylor M (1999). The development of accident – remedial intervention levels for rural roads. Transport Research Laboratory TRL Report 425, Crowthorne.

Broughton J., Markey K.A., and Rowe D. (1998) A new system for recording contributory factors in road accidents. Transport Research Laboratory TRL Report 323, Crowthorne.

Carsten O M J (1999) Can't go, won't go. In Procs. Speed: Whose business is it? PACTS February 1999.

Carsten O.M.J., Tight M.R., Southwell M.T. and Plows B. (1989) Urban Accidents: Why do they happen? AA Foundation for Road Safety Research, Basingstoke.

Christie N. (1995) The high risk child pedestrian: socio-economic and environmental factors in their accidents. Transport Research Laboratory. TTRL Project Report 117, Crowthorne.

Cloke J., Boulter P., Davies G.P., Hickman A. J., Layfield R.E., McCrae I.S., and Nelson P.M. (1998) Traffic management and air quality research programme. Transport Research Laboratory TRL Report 327, Crowthorne.

Compte S. (1998) Simulator study on the effects of ATT and non-ATT systems and treatments on driver speed behaviour MASTER Working Paper R 3.1.2. European Commission.

Corbett C. (1999) What would stop drivers speeding? PACTS Conference: Speed: Whose business is it. London, February 1999. PACTS, London.

CPRE (1999) Rural Traffic Fear Survey. CPRE, London.

Department of the Environment, Transport and the Regions (1998) A New Deal for Trunk Roads in England: Guidance on the New Approach to Appraisal, DETR.

Department of the Environment, Transport and the Regions (1999a) Road Accidents Great Britain: 1998 The Casualty Report. TSO.

Department of the Environment, Transport and the Regions (1999b) Highways Economies Note No. 1 – 1998 Valuation of the Benefits of Prevention of Road Accidents and Casualties. DETR.

Department of the Environment, Transport and the Regions (1999c) Vehicle Speeds Great Britain: 1998 TSO.

Department of the Environment, Transport and the Regions (1999d) The Highway Code. TSO.

Department of Health (1998a) Independent inquiry into inequalities in health – Acheson report. (http://www.official-documents.co.uk/document/doh/ih/synopsis.htm).

Department of Health (1998b) Report of the Committee on the Medical Effects of Air Pollutants.

Department of Health (1999) Saving Lives: Our Healthier Nation. TSO (http://www.offical-documents.co.uk/document/cm43/).

Farmer S.A., Barker J., and Mayhew N. (1998) A trial in Norfolk of interactive speed limit signs. Traffic Engineering +Control 39(5) London.

Farmer C.M., Retting R.A. and Lund A.K. (1999) Changes in motor vehicle occupant fatalities after repeal of the national maximum speed limit. Accident Analysis and Prevention 31 (1999) 537-543.

Finch D.J., Kompfner P., Lockwood C.R. and Maycock G. (1994) Speed, speed limits and accidents. TRL Project Report 58. TRL, Crowthorne.

Gloucester City Council and Gloucestershire County Council (1997) Gloucester Safer City – road safety strategy Gloucester Safer City.

Health Education Authority (1998) Transport and Health: A briefing for health professionals and Local Authorities. Health Education Authority, London.

Hillman M., Adams J. and Whitelegg J (1991) One false move... a study of children's independent mobility. Policy Studies Institute, London.

Hobbs C.A. and Mills P.J. (1984) Injury probability for car occupants in frontal and side impacts. TRRL Report 1124, TRRL, Crowthorne.

Hooke A., Knox J. and Portas D. (1996) Cost benefit analysis of traffic light and speed cameras. Police Research Series Paper 20, Home Office: Police Research Group.

Institution of Highways and Transportation (1990) Guidelines for urban safety management. Institution of Highways and Transportation, London.

Institution of Highways and Transportation (1999) Guidelines for rural safety management. Institution of Highways and Transportation, London.

Kloeden C.N., McLean A.J., Moore V.M., and Ponte G. (1997) Travelling speed and the risk of crash involvement. Federal Office of Road Safety, CR 172 (2 vols), 1997. 72 pp. Canberra.

Lex Service (1997) 1997 Lex Report on Motoring: Driving for safety. Lex Service London.

Mackie A. (1998) Urban speed management methods. Transport Research Laboratory TRL report 363, Crowthorne.

Maycock G., Brocklebank P.J. and Hall (1998) Road layout design standards and driver behaviour. Transport Research Laboratory TRL Report 332, Crowthorne.

Mitchell C.G.B. (1993) Influencing speed and its environmental benefits- vehicle design. PACTS Conference: Safety mobility and the environment – striking the balance, London, March 1993.

Parker D., Reason J.T., Manstead A.S.R and Stradling S.G. (1995) Driving errors, driving violations and accident involvement. Ergonomics 38 (5) pp 1036-48.

Plowden S. and Hillman M. (1996) Speed control and transport policy. Policy Studies Institute, London.

Quimby A., Maycock G., Palmer C. and Buttress S. (1999a) The factors that influence a driver's choice of speed – a questionnaire study. Transport Research Laboratory TRL Report 325, Crowthorne.

Quimby A., Maycock G., Palmer C. and Grayson G.B. (1999b) Drivers' speed choice – an in-depth study. Transport Research Laboratory TRL Report 326, Crowthorne.

Risser R. and Lehner U. (1998) Acceptability of speeds and speed limits to drivers and pedestrians/cyclists. MASTER Report D6. European Commission.

Sabey B. (1993) How fast is fast enough? Scottish Road Safety Campaign Seminar, Killing speed saving lives, 30 September 1993.

Silcock D., Smith K., Knox D. and Beuret K (1999) What limits speed? Factors that affect how fast we drive. Interim report June 1999. AA Foundation for Road Safety Research, Basingstoke.

Stradling S.G. (1999) Changing driver attitude and behaviour. Procs. Speed review Seminar, London 1999, DETR.

Stradling S.G., Meadows M.L. and Beatty S. (1999) Factors affecting car use choices. Transport Research Institute Report, Napier University, Edinburgh.

Suffolk County Council (1997) 30 mph speed limit initiative: speed monitoring. Report 960297/R01.0 Suffolk County Council, Ipswich.

Taylor M., Lynam D. and Baruya A. (2000) The effects of drivers' speed on the frequency of road accidents. Transport Research Laboratory TRL Report 421, Crowthorne.

Transportation Research Board (1998) Managing speed. Special Report 254, Transportation Research Board, National Research Council, National Academy Press, Washington.

Ward H.A., Cave J., Morrison A., Allsop R.E., Evans A.W., Kuiper C. and Willumsen L. (1994) Pedestrian activity and accident risk. AA Foundation for Road Safety Research, Basingstoke.

Watson D. (1999) The effect on accident occurrence of village speed limits in Suffolk. MSc Dissertation, Intercollegiate MSc, University of London, Centre for Transport Studies.

Webster D.C. and Mackie A.M. (1996) Review of traffic calming schemes in 20mph zones. Transport Research Laboratory TRL Report 215, Crowthorne.

Wernsperger F., and Sammer G. (1995) results of the scientific investigation accompnying the pilot trial of 30 kph limit in side streets and 50 kph limit in priority streets. Procs. Seminar G PTRC European Transport Forum, University of Warwick, 11-15 Sept. 1995.

TECHNICAL ANNEX

Speed Policy Review

TECHNICAL ANNEX

CONTENTS

(Subjects listed in order of appearance in the main paper.).

Terms used in the main paper

The terms excessive and inappropriate speed are used throughout this paper. Excessive refers to speeds above the mandatory limit (speeding). Drivers travelling at inappropriate speeds are those that whilst within the speed limit are going too fast for conditions such as negotiating a sharp bend, during poor weather or where there are unprotected road users.

The distinction between these two definitions is particularly important, regardless of whether it is road safety or environmental issues that are being considered. Establishing the nature of the problem in any given area is the key to identifying appropriate measures to tackle it. For example, the use of lower speed limits, even if they were to be respected, may not be the best way to address all problems.

The term 85th percentile, which is used when discussing vehicle speeds on individual roads, refers to the speed up to which 85 percent of the traffic is travelling. Viewed another way it is the speed only 15 percent of drivers exceed.

Local Traffic Authority (LTA) refers to the body responsible for setting local speed limits. Generally the LTA for trunk roads and motorways is the DETR's Highways Agency, and the LTA for all other roads is the local authority. In Scotland and Wales responsibility for motorways and trunk roads rests respectively with Scottish Ministers in the devolved administration and the Weslh Assembly.

National and vehicle speed limits

If the local traffic authority has not imposed its own limit on a road a national speed limit applies. The national 30mph limit is normally associated with urban areas and applies to all roads in England and Wales with street lighting, and in Scotland to all Class C and unclassified roads with street lighting. The link between a pre-determined speed limit and street lighting was introduced in the Road Traffic Act 1934. These roads are called "Restricted Roads"

The 70mph limit for motorways was originally introduced in 1965 and re-introduced in 1977 after the fuel crisis, along with the same limit for dual carriageways. The national speed limit on all other roads is 60mph. However, lower speed limits can apply to certain classes of vehicle, and it is the responsibility of drivers to be familiar with the national speed limits that apply to their vehicle. Figure A1 shows the main categories.

Figure A1: **National speed limits for the main classes of vehicle on roads in the UK. Source – The Highway Code, DETR 1999c**

SPEED LIMITS

Type of vehicle	Built-up areas* MPH	Elsewhere: Single carriageways MPH	Elsewhere: Dual carriageways MPH	Motorways MPH
Cars (including car derived vans and motorcycles)	30	60	70	70
Cars towing caravans or trailers (including car derived vans and motorcycles)	30	50	60	60
Buses and coaches (not exceeding 12 metres in overall length)	30	50	60	70
Goods vehicles (not exceeding 7.5 tonnes maximum laden weight)	30	50	60	70†
Goods vehicles (exceeding 7.5 tonnes maximum laden weight)	30	40	50	60

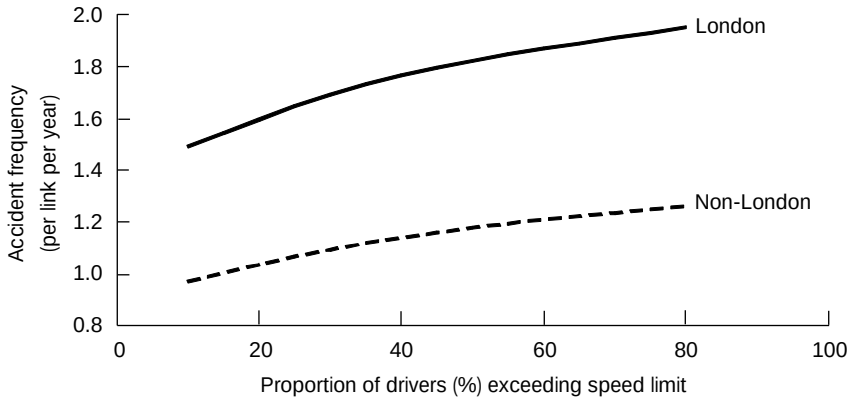
These are the national speed limits and apply to all roads unless signs show otherwise.
* The 30 mph limit applies to all traffic on all roads in England and Wales (and Class C and unclassified roads in Scotland) with street lighting unless signs show otherwise.

† 60 if articulated or towing a trailer

Accident frequency and the proportion of drivers exceeding the speed limit

Figure A2 (Taylor et al 2000, fig 11) shows predicted accident frequencies at different levels of non-compliance (P) with the speed limit for London and elsewhere (at the mean observed values for other variables in the model, including excess speed. Where Speed limit (S)=30/40 mile/h; Daily traffic flow (Q)=11/9k (London/non-L); Number minor junctions (NJ)=6; Pedestrian activity (Peds)<200/hr; Mean excess speed (Vex)= 4.5 miles/h; percentage of large vehicle in the flow (HGV)<12.5%; road class (non-B road)). In London the non-compliance level ranged from 4% to 73% and outside London the range was from 2% to 82%.

Figure A2



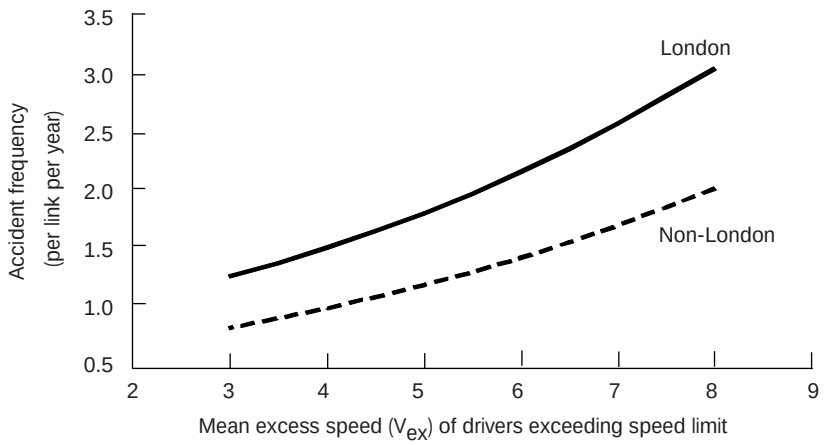
[S = 30/40 miles/h; Flow = 11000/9000 (London/non-London);
NJ = 6; Peds<200/h; V_{ex} = 4.5 miles/h;
Large vehicles<12.5%; Non-B Road]

The practical consequences of influencing the proportion of speeders may be illustrated as follows. If the proportion of speeders were to increase by a tenth, for example from 20% to 22%, the accident frequency would be expected to increase by 1.4%, if all else is held constant. If, on the other hand, the non-compliance level could be halved from 20% to 10%, for example by increased or more effective enforcement of the speed limit, then the accident frequency could be reduced by about 10% (Taylor et al 2000).

Accident frequency and mean excess speed

Figure A3 (Taylor et al 2000, fig 12) shows the predicted accident frequency plotted against various values of the excess speed for links inside and outside London (with the mean observed values of other variables in the model as above; the proportion of speeders is held constant for each curve at 25% (London) and 30% non-London).

Figure A3



[S = 30/40 miles/h; Flow = 11000/9000 (London/non-London);
NJ = 6; Peds<200/h; P(%) = 25/30 (London/non-London);
Large vehicles<12.5%; Non-B Road]

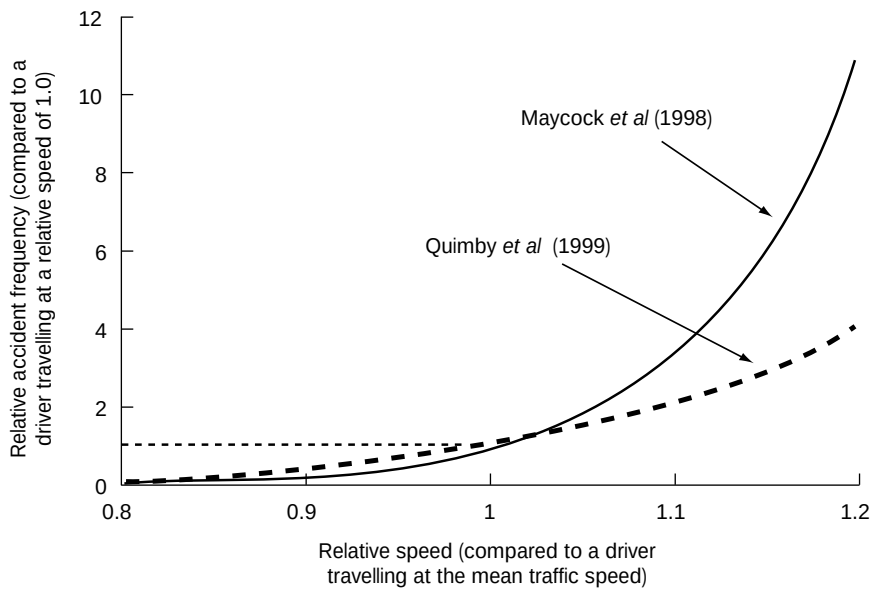
The implication of the findings illustrated by these curves is that targeting excessive speed through the use of measures which reduce the speed of the fastest drivers may well bring greater benefits than attempts to influence the speed of all drivers.

The relationship between accident involvement and speed choice

Results from studies of the responses of 5000 drivers to a questionnaire about accident involvement and speed choice indicate that for an individual who drives at a speed more than about 10-15 percent above the average speed of the traffic around them, the likelihood of their being involved in an accident increases significantly (Maycock et al 1998, Quimby et al 1999a, b).

Figure A4 (Taylor et al 2000, fig. 4) shows the relative accident involvement of a driver compared to that of a driver travelling at the average speed (i.e. one with a relative speed of 1.0). It shows clearly that drivers who habitually travel faster than average are involved in more accidents in a year's driving.

Figure A4



The Manchester Driver Behaviour Questionnaire

Researchers at the Driver Behaviour Research Unit at the University of Manchester have developed, over time, a self completion questionnaire for drivers from which a three fold typology of aberrant driving behaviours have been identified. These are:

- lapses – absent minded behaviours with consequences for the perpetrator but pose no threat to other road users:
- errors – typically misjudgements and failures of observation that may be hazardous to others: and
- violations – deliberate contraventions of safe driving practices.

Accident liability was predicted by self reported tendency to commit violations but not by tendency to make errors and lapses (Parker et al 1995).

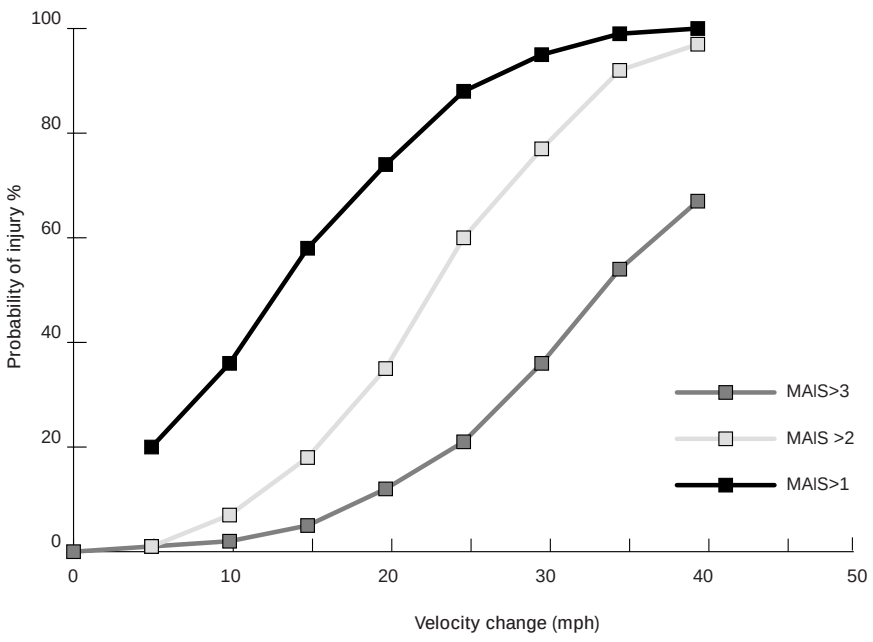
Respondents were required to indicate on a 6 point scale how often they indulged in each of 24 behaviours whilst driving. Typical items on the Driver Behaviour Questionnaire (DBQ) are:

Item	Type
Attempt to drive away from traffic lights in third gear	Lapse
Become impatient with a slow driver in an outer lane and overtake on the inside	Violation
Drive especially close to the car in front as a signal to its driver to go faster or get out of the way	Violation
Forget where you left your car in the car park	Lapse
Underestimate the speed of an oncoming vehicle when overtaking	Error
Attempt to overtake someone you hadn't noticed signalling to turn right	Error
Cross a junction when the lights had already turned red against you	Violation
Hit something when reversing you had not seen	Lapse
Get involved in unofficial races with other drivers	Violation

Probability of injury related to impact severity

Figure A5 shows the probability of injury related to impact severity for belted front seat occupants in frontal impacts. Lower impact speeds greatly reduce the risk and severity of injury and the greatest reductions in probability are seen at the lower impact severities. At 30mph the risk of serious injury (MAIS>3) to a belted car occupant in a front seat is three times greater than at 20mph, and at 40mph the risk is five times greater than at 20mph (Hobbs and Mills 1984).

Figure A5: **Probability of injury related to impact severity for belted front seat occupants in frontal impacts (based on Hobbs and Mills 1984)**



The definition of injury categories used by Hobbs and Mills was based on the 1980 revision of the Abbreviated Injury Scale (AIS) where:

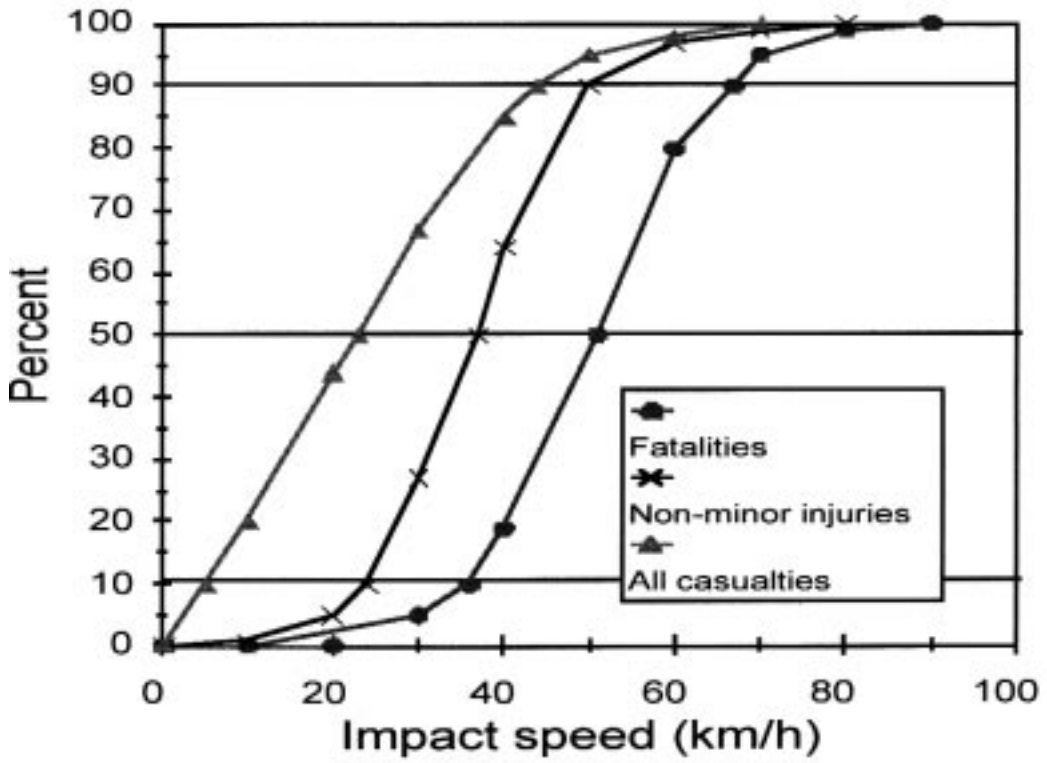
IS0	Uninjured
AIS 1	Minor
AIS 2	Moderate
AIS 3	Serious
AIS 4	Severe
AIS 5	Critical
AAIS 6	Maximum, virtually unsurvivable

The Maximum AIS (MAIS) is the highest single AIS code for a victim

Impact speed and severity of injury to pedestrians

Ashton and Mackay (1979) calculated impact speed distributions from at-the-scene pedestrian accidents for car and car derivatives. They found that 5 percent of fatalities occurred at impact speeds below 20mph, 45 percent occurred at less than 30mph and 85 percent occurred at speeds below 40mph. About 40 percent of pedestrians who are struck at speeds below 20mph sustain non-minor injuries however, this rises to 90 percent at speeds up to 30mph. These distributions are shown in Figure A6 and are for the whole population. Age effects mean that elderly pedestrians are more likely to sustain non-minor injuries than younger people in the same impact conditions.

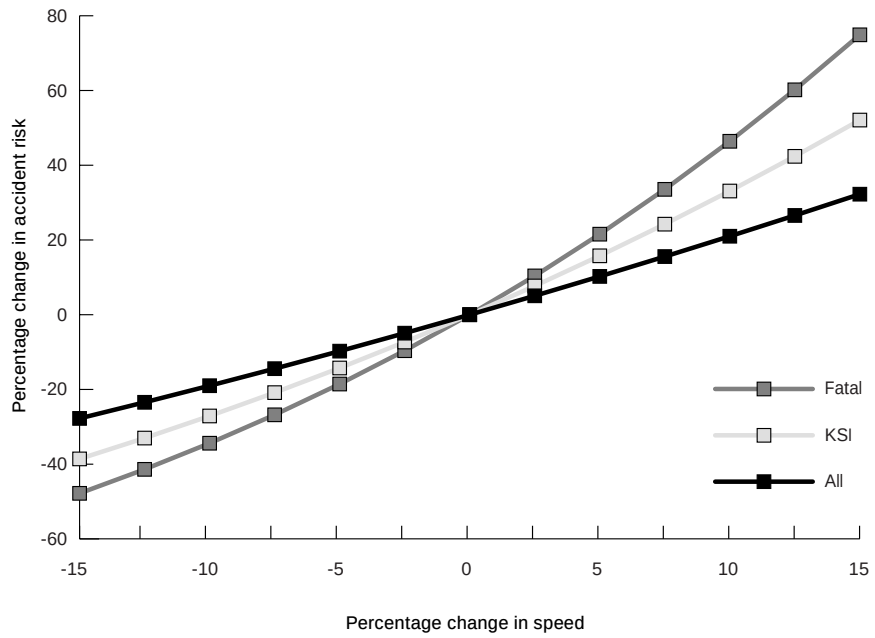
Figure A6: **Impact speed and severity of injury. Based on Ashton and Mackay (1979)**



Speed and injury severity

A Swedish model has been developed based on experiments with different speed limits in Sweden during 1968-71 and validated using later data. The model is based on the hypothesis that the probability of an injury accident reported to the police is proportional to the square of the speed, the probability of a fatal or serious accident is proportional to the cube of the speed and the probability of a fatal accident is related to the fourth power of speed (Andersson and Nilsson 1997).

Figure A7: **Relative risk and speed. Based upon the work of Andersson and Nilsson (1997)**



An Australian study found that in a 60km/h speed limit area, the risk of involvement in a casualty crash doubles with each 5km/h increase in travelling speed above 60km/h. They calculated relative risks of driving above the speed limit compared with driving with an illegal blood alcohol concentration. Even travelling at 5km/h above the 60 km/h speed limit increases the risk of crash involvement as much as driving with a blood alcohol concentration of 0.05 (Kloeden et al 1997).

Air pollutant and noise emissions

The Environment Act 1995 requires local authorities to review and assess the air quality in their areas against the objectives set out in the 1997 Air Quality Regulations. Road transport is one of the major sources of local air pollution and at the national level accounts for two-thirds of all emissions of four of the eight pollutants for which objectives have been set by the National Air Quality Strategy. In urban areas the contribution of road transport to emissions can be considerably higher. In London, for example, around three-quarters of all particulate and oxides of nitrogen emissions are from road transport. The application of suitable traffic management schemes has been suggested as a means of improving air quality in urban areas.

DETR is assessing the impacts of different speeds on levels of polluting emissions. Different speeds are associated with different levels of emissions, although the relationship is not a linear one. The effects of speed on emissions and noise on individual stretches of road are easier to assess than the effects over the network as a whole.

The environmental impacts of speed management measures in terms of noise and emissions are not linear or straightforward and changes in speed have different effects on different pollutants and noise levels. During transitional periods, particularly during harsh acceleration, emissions from vehicles increase sharply. To further complicate strategies to reduce emissions, production of oxides of nitrogen follows a different pattern from those of carbon monoxide or hydrocarbons.

Figure A8: **PM_{10} emissions from a Euro II diesel car relative to vehicle speed**

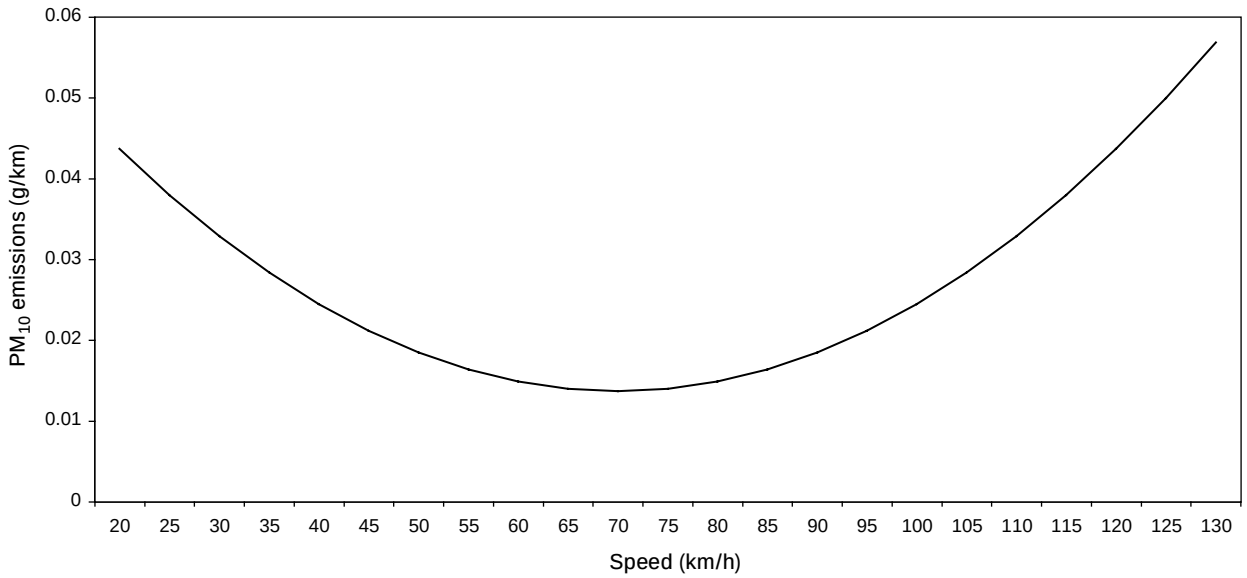
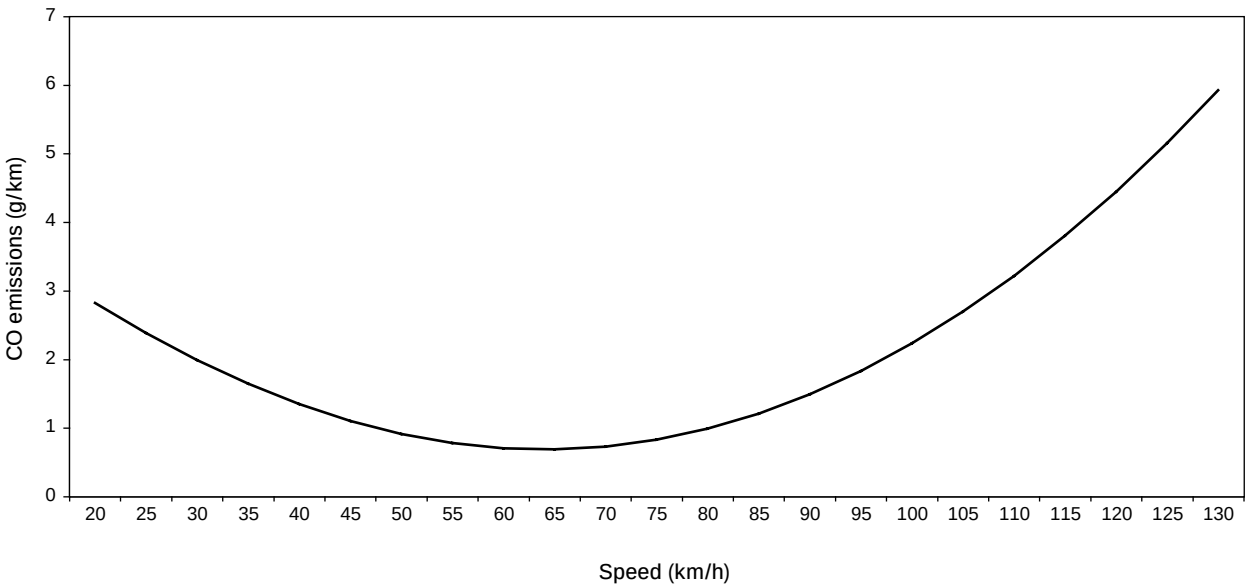
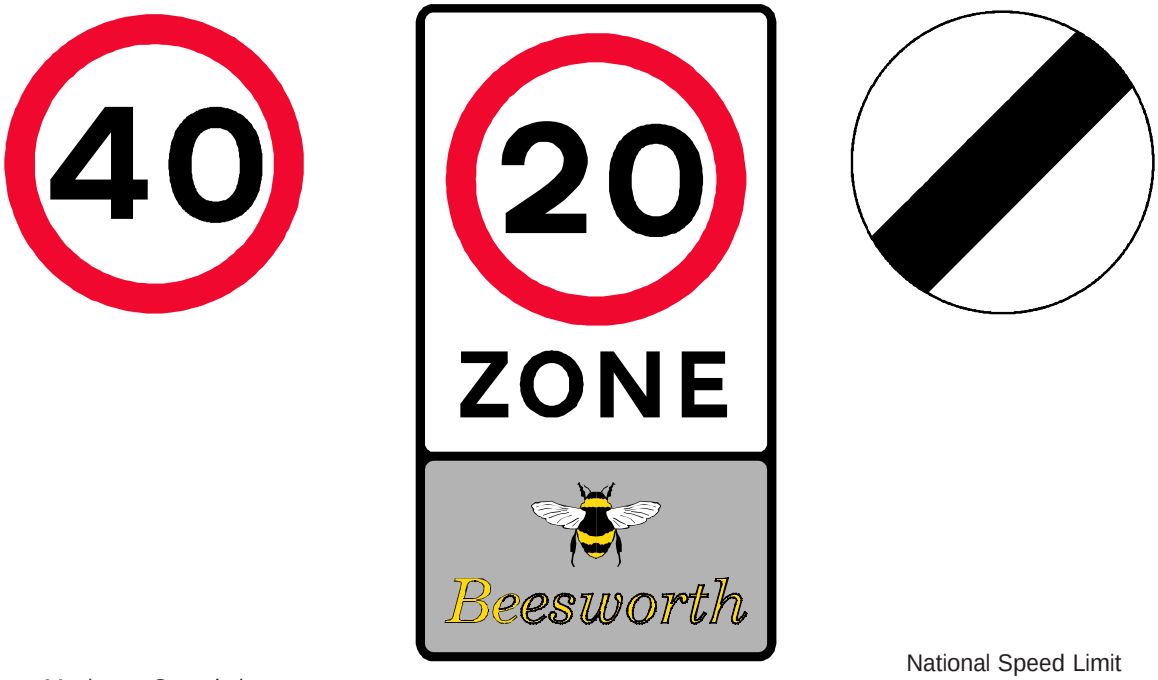


Figure A9: **CO emissions from a Euro II petrol car relative to vehicle speed**



UK Speed Limit Signs

Prescribed Speed Limit Signs



Maximum Speed sign

20mph Zone sign

National Speed Limit applies sign

Controlled Motorway Project

The Controlled Motorway Project is currently being assessed by the Highways Agency on a part of the M25. This automatically adjusts the speed limit to reflect prevailing conditions, and enforces it with speed cameras. Early results have been encouraging. Speed limit compliance has been very high, the incidence of excessive speed reduced, and short headways have been reduced.

It is too early to draw any conclusions on the effect of the system on accident rates, but lessons learnt from the pilot scheme could possibly be applied to other parts of the motorway network.

The Crime and Disorder Act

Sections 5-7 and 17 of the Crime and Disorder Act 1998 (The Act) require local authorities and the police with other key agencies and the community to work together in partnership at district level to develop and implement strategies for reducing crime and disorder in the area. This work is to include conducting an audit of local crime and disorder problems, involving full consultation; developing a strategy with targets based on the findings of the audit; and publishing details locally of the entire process, including ownership of the targets and performance against them.

Home Office guidance on how local agencies should bring the requirements of the Act into operation states quite clearly that the strategies developed to counter crime and disorder must be driven by what matters to local people, and not constrained by prerequisites or artificial definitions imposed by central government. It goes on to say:

> "so if your audit finds that, say, speeding in residential areas is a serious matter of local concern, then it would be just as much in order for the strategy to focus on this issue as it would be for it to look at, for example, kerb crawling or bogus officials in the same area."

The Crime and Disorder Act does not apply in Scotland where a non-statutory approach has been taken. In determining local priorities for community safety measures, including road safety, it is expected that the strategy document "Safer Communities through Partnerships – a Strategy for Action", drawn up by the Scottish Office in partnership with the Association of Chief Police Officers in Scotland and the Convention of Scottish Local Authorities, will have an important role to play.

It is too soon to establish the extent of the Act's contribution to speed management. However, once the system has bedded down and information is available an assessment will need to be made of its effects.

French Village Speed Limits and signs

In France there is a national speed limit through urban areas (agglomeration) where the size of the urban area encompasses the British definition of a village as well as towns and cities. However, if the settlement consists of a few houses and a garage or restaurant it may be called a "lieu dit" in France. These settlements may have a name but they are considered too small to have the national urban speed limit applying to them and thus have the national rural speed limit of 90 km/h. They are denoted by a sign with the "village" name in white on a blue background (French sign E31). There is an expectation that drivers will reduce their speed, but this sign does not legally signify a speed limit.

For villages with more than a very small number of houses, the French have a sign which is placed at all the entrances to the urban area. It has the village or town name in black on a white background and the sign has a red border (sign EB10). The end sign is the name of the village in black on a white background with no red border but the town name has a red line though it (sign EB20). Between these entrance and exit signs the speed limit of 50km/h applies to all roads.

Other speed limits can apply but the road layout and required signing are specific to these limits, for example a "zone 30" which has a 30 km/h speed limit.

Rehabilitation courses and driver improvement schemes

The 1991 Road Traffic Act provided for a large-scale experiment in the use of rehabilitation courses for drink-drive offenders. Designated courts are able to offer offenders, who they believe may benefit, the opportunity of attending a rehabilitation course run by an organiser approved by the Secretary of State. It is for the offender to decide whether to accept the offer of a referral to a course. The offender is required to pay a fee to attend, but, if the course is successfully completed, the period of disqualification from driving is reduced by up to a quarter.

The results from the experiment have been encouraging. Research to date shows that in 30 months after sentencing those who had attended a course were up to 3 times less likely to re-offend than those who had not attended. People in the 30-40 age group responded particularly well to courses. This approach may be of benefit if applied to speed management.

There are already Driver Improvement Schemes (DIS) run by Police and Local Authorities for speeding offenders without reference to the courts. There may be benefit in investigating the feasibility of developing DIS and drink-drive style rehabilitation courses for speeding.