



Speed Assessment Framework

Balancing safety and mobility objectives on rural single carriageway roads

UPDATED GUIDANCE ON SETTING LOCAL SPEED LIMITS ON RURAL SINGLE CARRIAGEWAY ROADS

Balancing the need to travel with the need to improve the quality of life is a key objective of the Department for Transport (DfT). This requires a speed policy that will take account of the contribution of travel speeds to environmental and social objectives as well as to road safety.

This Leaflet supplements the guidance on Rural Single Carriageway Roads set out in DfT Circular 01/2006.

Aims of this revised guidance include

- the setting of more appropriate local speed limits, including lower or higher speeds where conditions dictate
- local speed limits which better reflect the needs of all road users, not just motorised vehicles
- improved quality of life for local communities and a better balance between road safety, accessibility, and environmental objectives, especially in rural communities

- improved recognition and understanding by road users of the risks involved on different types of road, the speed limits which apply, and the reasons why
- improved respect for speed limits, and in turn improved self compliance
- continued reductions in the number of road traffic collisions, injuries, and deaths in which excessive or inappropriate speed is a contributory factor.

OVERALL PATTERNS OF SPEED ON DIFFERENT ROADS

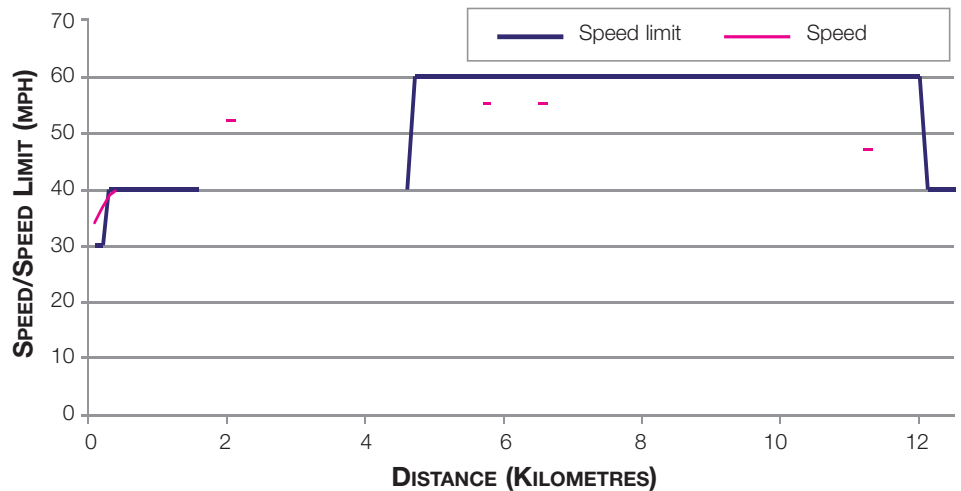
Speeds on single carriageway rural roads are generally well within the national 60mph speed limit. Observations from 270 sites around England show a wide distribution of mean speeds on roads with speed limits of 60mph. They also show that, for the majority of roads, mean speeds are already below the posted limit or would typically only need to be reduced by a few miles per hour, where lower limits might be required.

SPEED LIMIT (MPH)	MEAN SPEED (MPH)							
	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
40	4	9	33	38	6	1		
50				1	11	11	2	
60	3	5	11	20	37	43	28	6

VARIATION OF SPEED ALONG A ROUTE

Speed limits already vary along routes to reflect variations in road quality and roadside development. In general mean speeds follow this variation quite well, as illustrated in the graph of mean speed variation along a B Class road.

The revised guidance confirms and firmly establishes good practice already adopted by many local authorities.



PRINCIPLES

Speed limits in themselves are only one element of speed management and the aim should be to achieve a 'safe' distribution of speeds which reflects the function of the road and the impacts on the local community. Local speed limits should not therefore be set in isolation but as part of a package with other measures to manage speeds which includes engineering and landscaping standards that respect the needs of all road users and raise the driver's awareness of their environment, together with education, driver information, training, and publicity. The first priority where accident rates are high should be to seek low cost improvements to reduce rates.

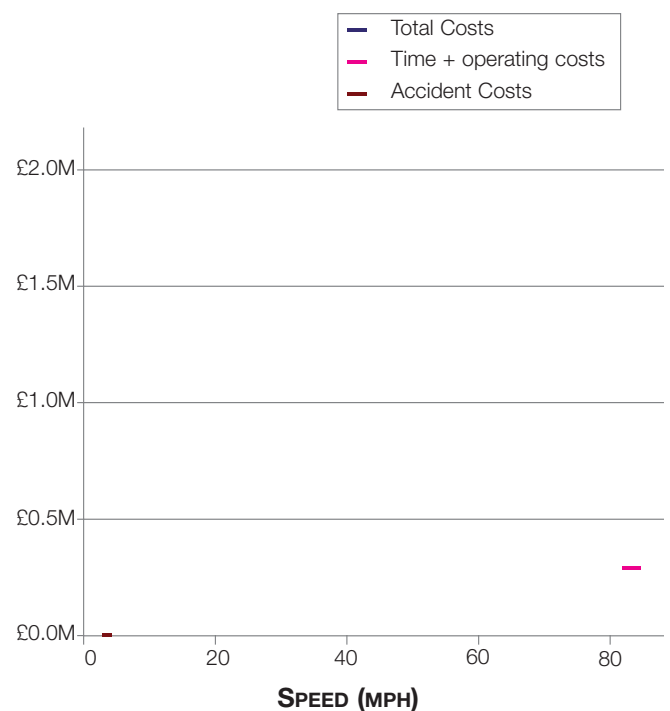
A principal aim in setting appropriate speed limits should be to alert drivers to the function of the road or road geometry and environment, and to changes that occur along a route. For the majority of roads there is a consistent relation between mean speed and 85th percentile speed. Where this is not the case, it will usually indicate that drivers have difficulty in deciding the appropriate speed for the road, suggesting that a better match between road design and speed limit is required.

MEAN SPEED GIVING MINIMUM TOTAL COST FOR DIFFERENT RURAL ROAD TYPES

Hilly, bendy roads	31mph
Multi access, bendy roads	43mph
Good alignment but high junction density	49mph
Good alignment, few junctions	53mph

PRINCIPLES OF BALANCED COST

Drivers and riders of motor vehicles, pedestrians, cyclists and equestrians have different views about what speed is appropriate on rural roads. Opinions also differ as to what constitutes a reasonable balance between risk of an accident, travel efficiency and environmental impact. As speeds increase, travel costs decrease but accident costs increase. The solution adopted here is to identify, for each type of road, the mean speed at which the total of the accident and travel costs is minimised. Mean speeds reflect what the majority of drivers perceive as an appropriate speed for the road. For a particular road type, total cost is similar over a relatively wide speed range, with mobility benefits being exchanged for safety benefits as speeds decrease.



OUTLINE OF THE PROCESS

(See Appendix E to DfT Circular 01/2006)

A common assessment framework has been developed to help achieve a consistent application of speed limit policy. It involves:

- classifying roads into two tiers based upon their traffic function
- establishing for each road which speed limit is most appropriate, to minimise overall costs
- considering 'accident threshold' levels, which are expected levels associated with a road carrying a given level of traffic in a given situation
- local flexibility of choice

ROAD TYPES DEFINING FUNCTIONAL TIERS

(See Appendix D to DfT Circular 01/2006)

The table indicates the conditions for assigning roads to functional tiers, and the speed limits most likely to be suitable in the longer term for each tier subject to their meeting local needs and considerations.

TIER	FUNCTION	SPEED LIMITS
Upper tier	Catering primarily for through traffic (typically A/B class)	50 or 60 mph
Lower tier	Local or access function	40 or 50 mph

RELEVANCE OF ACCIDENT LEVELS, ROADSIDE DEVELOPMENT, ENVIRONMENT, LANDSCAPE AND VULNERABLE ROAD USERS

- Within the two tiers, accident rates (existing or predicted) should generally be used to help decide whether a higher or lower speed limit is appropriate.
- Where roadside development is within the definition for the village speed limit of 30mph, this should be used. Alternative reduced limits should be considered where roads have other substantial levels of development.
- If a road is a recommended route for vulnerable road users including walkers, cyclists, horse riding or has other environmental or landscape factors, consideration should be given to using a lower limit (even if the accident rate is below the thresholds suggested).

ASSESSMENT PROCESS

The aim of the assessment process is to help decision makers weigh up the advantages and disadvantages of each of the speed limit options for each tier.

- consider if the level of development requires special treatment,
- consider which functional tier is appropriate for the road,
- estimate the current mean speed and accident rate (as all injury accidents per 100 million vehicle km),
- check the accident rates against acceptable thresholds,
- if the accident rate is high, check the proportion of different accident types against the investigatory thresholds recommended in TRL's Accident Analysis on Rural Roads and consider whether site or route treatment is appropriate before deciding speed limit,
- if a speed limit lower than the current one is indicated, estimate the mean speed and accident rate and the influence on social factors that would result from implementing the new limit,
- check that these values are acceptable; if not consider whether further measures are necessary to bring speed and accident rates into balance.

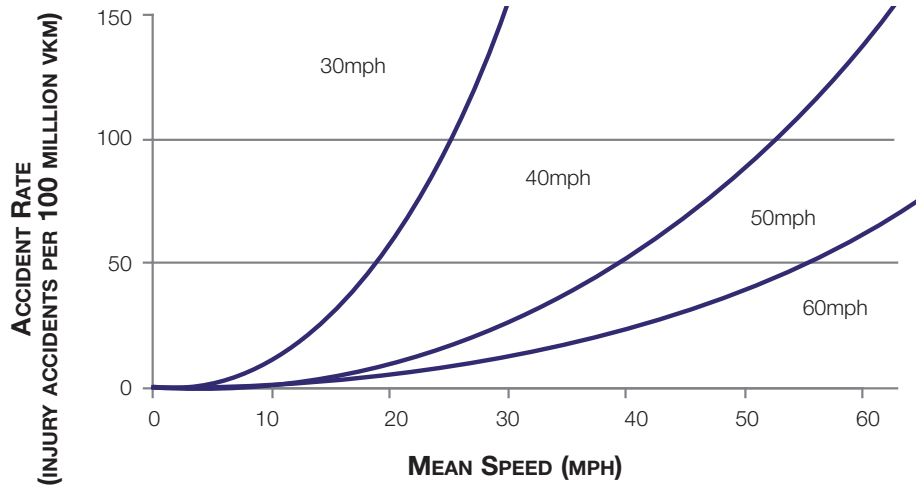
ACCIDENT RATE TRESHOLDS

- Drawing upon the relationship between speed and accidents set out in TRL report 511, the accident rate information available and the minimum total cost at a particular speed, TRL PPR 025 sets the following accident thresholds for Upper and Lower Tier roads:
 - Upper Tier roads - 35 injury accidents per 100 million vehicle kilometres
 - Lower Tier roads - 60 injury accidents per 100 million vehicle kilometres
- The speed assessment framework operates on the principles that the speed limit choice should be guided by whether the accident rate on a section of road is above or below the respective 35 or 60 injury accident thresholds.

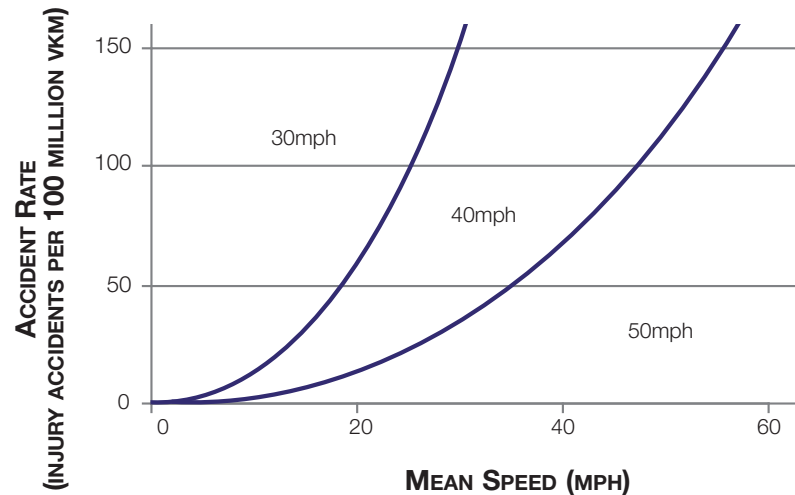
RISK, SPEED, SPEED LIMIT CHARTS

These charts can be used initially to assess whether current speed limits are consistent with the minimum cost based speed limits indicated by the assessment framework.

SPEED LIMITS ON UPPER TIER ROADS



SPEED LIMITS ON LOWER TIER ROADS



EXAMPLE OF TABLE FOR SECTIONS ALONG AN UPPER TIER ROUTE

The analysis below suggests that the limit over the first two sections of the route should be reduced from 60 to 50mph. For section A, added measures should be considered to further reduce the accident rate; for section B, added measures would be needed to ensure the mean speed was within the new limit. For section D, although the current mean speed is well below 50mph, the accident rate is below the threshold without reducing the limit. The situation should be reviewed regularly.

SECTION	LENGTH (KM)	ACCIDENTS IN 6 YEARS		EXISTING SPEED LIMIT (MPH)	AADT FLOW	MEAN SPEED (MPH)	ACCIDENT RATE PER 100 MILLION VKM		PROPOSED SPEED LIMIT (MPH)	ADDED MEASURES NEEDED?
		FATAL & SERIOUS	SLIGHT				ALL INJURY	F&S		
A	0.65	0	7	60	6100	33	81	0	50	yes
B	1.55	4	10	60	9600	44	43	12	50	yes
C	2.35	2	18	40	9600	36	40	4	40	
D	1.60	1	8	60	6900	42	33	4	60/50	
E	1.00	4	3	40	6900	40	46	26	40	
F	1.65	1	7	60	6900	44	32	4	60	

USING SPREADSHEETS FOR DETAILED CALCULATIONS

Most roads can be assessed using the basic principles described previously. However a spreadsheet can be downloaded from www.trl.co.uk to help in considering the effects of alternative speed limit choices.

Please select the appropriate description of the road from the list on the right.

Upper Tier	↑
Lower Tier	
Partial development	
Village	↓

Road characteristics			Current values	With extra measures
Road name	A123			
Link length (km)	3.5			
Flow (AADT)	8788			
HGV Flow	High	↕		
Walking activity	Medium	↕		
Cycling activity	High	↕		
Horse riding activity	High	↕		
Speed Limit	60 mph	↕		
Mean speed (mph)	53.0		50.0	
Injury Accidents	25		19.5	
Years of Data	5		5	
Annual Accidents	5.0		3.9	
Accident Rate (per 100m veh km)	44.5		34.7	

Additional measures	Measure	Likely effect
Speed measure		-3.0 mph
Accident measure		-10%

		Current	Proposal 1	Proposal 2
Speed	Speed Limit	60	60	50
	Use additional measures (Y/N)		No <input type="checkbox"/>	No <input type="checkbox"/>
	Mean Speed	53	53.00	50.00

		Current	Proposal 1	Proposal 2
Accidents	Annual Number	5.00	5.00	4.33
	Accident Rate	44.54	44.54	38.55
	Maximum acceptable rate		35.00	
	Annual Cost	£ 533,550	£ 533,550	£ 461,787
	Change		£ -	-£ 71,763

		Current	Proposal 1	Proposal 2
Time	Annual Cost	£ 1,214,898	£ 1,214,898	£ 1,287,792
	Change		£ -	£ 72,894

		Current	Proposal 1	Proposal 2
Fuel	Fuel Cost	£ 204,382	£ 204,382	£ 199,932
	Change		£ -	-£ 4,451

		Current	Proposal 1	Proposal 2
Total	Change		£ -	-£ 3,320

		Current	Proposal 1	Proposal 2
Qualitative Factors	Encourages walking		--	--
	Encourages cycling		--	-
	Encourages horse riding		--	--
	Reduces severance		--	-
	Reduces noise nuisance		-	0

This spreadsheet evaluates the possible consequences of changing the speed limit on a road or network. It calculates the expected changes in the number of accidents, in time spent by vehicles on the road and in fuel consumption.

If the predicted accident rate or mean speed are greater than the acceptable threshold then they are marked in red and extra measures are needed. These can be added in the left hand panel. Any measure that affects the mean speed will also be assumed to have an effect on the accident rate. Costs changes are based on the cumulative effect of an additional measures and the speed limit change.

Data can be entered into green cells and selection boxes. Yellow cells cannot be changed.

When should you use it?

- On road sections where the effects of changes are marginal or uncertain
- To provide detailed information on speed and cost changes

What data do you need to input?

- Traffic flows and mean speeds
- Current accident rates
- Potential safety measures and their effects

How can you test options?

- Choose the road tier appropriate for the section and the most likely speed limit options and their effects are displayed
- Relevance of environmental factors can be entered manually to be considered in the decision

What outputs are produced?

- Revised mean traffic speed with speed limit options with or without any additional measures
- Changes in travel costs and safety costs for different speed limit options

ENQUIRIES

Speed Management Branch,
Road User Safety Division,
Zone 2/13, Great Minster House,
76 Marsham Street,
London,
SW1P 4DR.
Telephone: 020 7944 8818/2058/2252
email: mark.magee@dft.gsi.gov.uk

Scottish Executive Enterprise,
Transport and Lifelong Learning Department,
Bus, Freight and Roads Division,
Zone 2-F, Victoria Quay,
Edinburgh,
EH6 6QQ.
Telephone 0131 244 0847
e-mail: Neil.Weston@scotland.gsi.gov.uk

REFERENCES

Department for Transport, Circular 01/2006, Setting Local Speed Limits, TSO 2006

Taylor MC, Baruya A, Kennedy JV. (2002) The relationship between speed and accidents on rural single carriageway roads, TRL Report 511.

Lynam D, Hill J, Barker J. (2004) Developing a speed management assessment framework for rural single carriageway roads, TRL, PPR 025, 2004

Accident analysis on rural roads - a technical guide, TRL, PPR 026, 2004

Details of Traffic Advisory Leaflets available on the DfT website can be accessed as follows: www.dft.gov.uk
From the DfT homepage, click on Roads and Vehicles, then Traffic and Parking Management and then Traffic Advisory Leaflets.

The Department for Transport sponsors a wide range of research into traffic management issues. The results published in Traffic Advisory Leaflets are applicable to England, Wales and Scotland. Attention is drawn to variations in statutory provisions or administrative practices between the countries. The Traffic Advisory Unit (TAU) is a multi-disciplinary group working within the Department for Transport. The TAU seeks to promote the most effective traffic management and parking techniques for the benefit, safety and convenience of all road users.

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Requests for unpriced TAU publications to:
Charging and Local Transport Division,
Zone 3/17, Great Minster House
76 Marsham Street, London, SW1P 4DR.
Telephone 020 7944 2478
e-mail: tal@dft.gsi.gov.uk

Within Scotland enquiries should be made to:
Scottish Executive, Development
Department, Transport Division 3, Zone 2-F,
Victoria Quay, Edinburgh, EH6 6QQ,
Telephone 0131 244 0847
e-mail: roadsafety2@scotland.gsi.gov.uk

Within Wales, enquiries should be made to:
Welsh Assembly Government,
Transport Directorate, 2nd Floor, Cathays Park,
Cardiff, CF10 3NQ
Telephone 02920 826947
e-mail: andrew.hemmings@wales.gsi.gov.uk



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