Transport for London

London Assembly Transport Committee
The Impact of Speed Humps

Memorandum of Evidence

1. Introduction

1.1. Transport for London (TfL) is the Mayor of London's traffic and transport authority with responsibility for delivering transport infrastructure as well as public transport services across the Capital.

1.2. The Mayor has published London's Road Safety Plan, which contains road safety targets of 40% reductions in Killed and Seriously Injured (KSI) by 2010 (50% for children). In addition there are specific targets of a 40% reduction in KSI for pedestrians, cyclists and powered two wheeler users.

1.3. The London Road Safety Unit (LRSU) within TfL collects the casualty figures (STATS19) for London, produces reports, monitors progress towards the targets and identifies sites for remedial safety treatment. LRSU also formulates and manages road safety education, training and publicity campaigns. The LRSU also allocates funding to the London Boroughs for their safety schemes, 20mph zones and safety education initiatives.

1.4. TfL is responsible for the main road network - around 550 kilometres. There are no road humps on TfL roads.

1.5. There are around 13,000 kilometres of borough roads in London, of which a large proportion are in residential areas. In 2002 there were 177 fatal, 3839 serious and 25,428 slight casualties on borough roads – 71% of all London's casualties. Traffic calming and 20mph zones would be an appropriate treatment for many of these roads and have the potential to deliver large casualty savings. Safety measures in residential areas are an important element in meeting (and beating) the Mayor's casualty reduction targets.

1.6. The following evidence is supplied in response to the letter from Lynne Featherstone to Bob Kiley, dated 25th September, which raised 8 queries (paragraphs 2 to 9 below). A bibliography of referenced and supporting material is given in Annexe A.

1.7. The position regarding speed humps and buses is set out in TfL guidelines, to which no further reference is made to in this document.

2. Do Speed Humps Affect Delivery of Emergency Services ?

2.1 The installation of road humps will reduce speeds in the roads concerned. Using a model produced by the LRSU, the additional delay caused by each road hump is estimated to be about 2.7 seconds. The model assumes that link speeds fall from 40mph to 27mph, with a hump crossing speed of 14.7mph.

2.2 The London Ambulance Service has made claims that 500 lives are lost each year due to increased response times, which they attribute entirely to road humps. This claim is unsubstantiated. The main factors affecting emergency vehicle response times are general vehicle speeds in the network, which result from overall levels of flow and congestion.

2.3 Road humps are generally installed in residential areas, i.e. roads with low flows and not part of the strategic main road network. The majority of vehicles spend most of their time on main roads.

2.4 The Department for Transport (DfT) guidance was that traffic calmed areas should be limited in size, such that ideally, no part of the scheme is greater than 1 km from the boundary. Given that the average spacing of road humps is in the order of 75m, a maximum of 14 humps would need to be traversed in cases where this guidance is followed.

2.5 Currently around 390 kilometres of road have been treated as part of the 137 20mph zones in London. There are additional roads that have been treated with road humps as part of other traffic calming schemes (not 20mph zones), but no accurate information is available on the total length of these roads at present. It is estimated that the amount of this traffic calmed road to be very approximately 3 times the length of 20mph zones, i.e. about 1,200 kilometres. This would give an estimate of about 1,600 kilometres of treated road in total.

2.6 Traffic calming reduces killed and seriously injured casualties by around 50%, which leads to fewer ambulance call outs for road traffic collisions.

2.7 Measures can be taken to limit the effect of humps on emergency services. These include but are not limited to:

- Optimising the routing of emergency service vehicles.
- Consultation over the location, design and scope of traffic calming measures used. For example ‘cushions’ are nearly as effective and cause less disruption for larger vehicles.
- For some streets the use of horizontal calming measures might be more appropriate.

- The consideration and use of new types of traffic calming techniques.

3. Do Speed Humps Damage Residential Properties ?

3.1. Ground-borne vibrations are considered to be a potential source of damage to property. There are a number of factors that affect the levels (amplitudes and frequencies) of ground-borne vibrations associated with vehicles going over road humps. These include vehicle weight, speed and load, as well as hump design and local geology.

3.2. Although there is evidence that installing humps increases vibrations experienced in properties close by, a research study by the Transport Research Laboratory (TRL) has shown that, given that these increases are very small, it is very unlikely that even superficial damage could be caused by the installation of humps and cushions.

3.3. It is worth noting that higher vehicle speeds and weights are associated with higher amplitudes of ground-borne vibrations, irrespective of the presence of humps. Thus reducing speeds on residential roads may reduce the potential of vehicles to damage property in sections between humps.

4. Do Speed Humps Increase Air and Noise Pollution ?

4.1 TRL has undertaken several studies on the effect of road humps on the environment. The main findings are as follows.

- Installing road humps reduces flow on the streets, usually by removing inappropriate 'rat-running' traffic. The study of London's 20mph zones found the overall reduction to be 15%. This reduced traffic flow generally improves the environment.
- A study by TRRL (Report 1017) showed that overall average noise levels reduced with the introduction of road humps, mainly through the reductions in flows and vehicle speeds.
- Several studies by TRL (Reports 186, 878 and 1017) of residents' opinions along treated routes, have shown that noise levels are perceived to have decreased following the installation of humps.
- The studies have also found, however, that noise patterns may change as a result of the installation of road humps, from more continuous and louder noise (more and faster traffic) to quieter background noise punctuated with louder noise events (skip lorries, milk floats etc).

4.2 There appears to be limited agreement over the effects of traffic calming on vehicle emissions:

- Area-wide studies (in a number of countries) have shown a decrease in NO_x (Nitrous Oxide) emissions as a result of traffic calming. NO_x emissions are part of the National Air Quality Strategy and hence arguably the most important form of exhaust emission.
- The area-wide studies were less conclusive on the effects on CO (Carbon Monoxide) and HC (Hydro Carbon) emissions.
- Studies based on single sections of road have shown a wide range of results with a wide variation in the changes of NO_x and CO levels. They did, however, show a reasonably consistent increase in fuel consumption and HC emissions due to traffic calming, albeit with only a small number of studies covering the latter (TRL Report 482).

4.3 Any drivers who switch to another transport mode as a result of the introduction of traffic calming measures will be responsible for a reduction in CO, HC and NO_x emissions, as alternative public transport modes are less polluting (per passenger trip).

5. Do Speed Humps Increase Congestion in Residential Areas ?

5.1 There is no evidence that road humps increase congestion in residential areas; in fact traffic flows are reduced on the roads where they are installed.

5.2 Displaced vehicles are likely to either migrate to nearby main roads (majority) or disappear altogether as users choose other modes (minority). Clearly, however, the extent to which drivers alter their route as a result of a traffic calming scheme is strongly influenced by the alternatives provided by the local road network and public transport services.

5.3 Schemes should be designed to take into account the migration of traffic from one type of road to another.

5.4 Traffic flows on residential roads are typically about one thousand vehicles per day whereas flows on neighbouring main roads will be many thousands of vehicles per day. The migration of traffic from the former to the latter will therefore generally have a relatively small impact on the traffic flows and congestion on the main roads.

6. Do Cars Try To Make Up Time By Speeding Between Zones ?

6.1. There are no reported studies addressing this question, so there is no evidence either way. It is likely, however, that the most common limiting factor affecting individual vehicle speed on many roads in London is the speed of the vehicle in front and the speed limit. Hence there is a limited scope for drivers to increase speeds beyond the speed of the ambient traffic.

7. Do Speed Humps Damage Cars ?

7.1. If correctly designed, installed and maintained, speed humps do not damage cars travelling at appropriate speeds. A TRL study tested various designs of road humps with a range of standard and modified vehicles. The current DfT guidance on the design of road humps is appropriate for current vehicles.

7.2. An appropriate speed for driving over humps is less than 20 mph and studies have shown that the speeds that vehicles cross humps are around 14 mph.

7.3. There is no legal minimum clearance limit for vehicles under UK law, so cars can be lowered down to any height. Lowered vehicles will be more at risk from hitting elevated sections of road, including road humps.

8. Are there any Alternative, Cost-Effective Measures to Speed Humps and, if so, Which Technologies Would You Favour ? (e.g. Home Zones, Safety Camera Technology, Speed Limiters)

8.1. Evidence shows that signs alone do not reduce speeds significantly, so other measures are necessary.

8.2. Alternative engineering measures including cushions and chicanes have been used successfully in schemes.

8.3. Education, training and publicity initiatives can (and do) make a positive contribution to safer driving and fewer road casualties.

8.4. There are a limited number of alternatives at the present time:

- Redesign of the road network along the lines of Home Zones would deliver reductions in speed and hence safety benefits. The cost of doing this, however, would be very high.
- Using safety cameras to lower speeds to below 30mph could have the same effect as road humps, and therefore give similar safety benefits. There are, however, practical problems in doing this. Revenue generated from speeding infringements cannot, in the

general case, be hypothecated for mass action schemes (unlike safety camera partnerships), so the cost of using cameras would be high. Decriminalisation of speeding offences would solve this problem, but would require new legislation.

- The 'SPECS' camera system that identifies number plates at the entry to a zone and measures average speeds along a link, would seem to be very appropriate for lowering speeds in residential areas. Measures would be limited to the gateways and have less effect on residents who are more likely to stop, as opposed to vehicles passing through.
- Variable speed and message signs have been shown to be effective in reducing speeds, but the costs would be high compared to road humps.
- In the longer term, speed limiters in vehicles could be used to reduce speeds automatically and hence deliver the road safety benefits. This technology would require installing equipment in all vehicles and a system that identified the speed limit of every link in the network.

9. What is Your Experience of the Effectiveness of Road Humps in Preventing and Reducing the Number of Fatal Injuries and Traffic Collisions ?

9.1. The evidence is conclusive that reductions in the numbers and severity of injury accidents can be achieved through reducing vehicle speeds. A study by TRL (Report 421) concluded that every 1mph reduction in average speed on a link will result in a 5% reduction in accident frequency. This figure increases to 6% on urban roads.

9.2. TRL Report 215, 'Review of traffic calming schemes in 20 zones', investigated zones across the UK looking at, amongst other things, their impact on accident numbers (data was used from 72 schemes). This research found the following:

- Comparisons of 'before' and 'after' accident data show that average annual accident frequency fell by about 60%.
- Accidents involving children fell by an average of 67%.
- Overall speeds fell, on average, by 9.3 mph leading to a 6.2% reduction in accidents for each 1 mph reduction in vehicle speed.
- Accident migration onto surrounding roads was not found to be a problem.

9.3. TfL recently commissioned research into 20mph zones in London and published the results in LRSU Safety Research Report No.2, 2003 (from TRL research in unpublished project report PR/T/077/03). The conclusions were:

- The installation of 20 mph zones in London has reduced the frequency of road user casualties within the zones by about 45% and reduced the frequency of fatal and serious (KSI) casualties by about 57%.
- Flows in the treated streets fell by around 15%.
- Accident migration onto surrounding roads was not found to be a problem.
- A detailed breakdown by road user class is shown in table 1

Table 1: Before and after -- Casualties per year per site by road user class

Road User Class	All Casualties per year per site[1]			KSI casualties per year per site[1]		
	Before[2]	After[3]	% Reduction	Before[2]	After[3]	% Reduction
All Casualties	4.96	2.66	46%	0.79	0.32	60%
Pedestrians	1.37	0.83	40%	0.32	0.16	50%
Child Pedestrians	0.75	0.39	48%	0.19	0.07	61%
Pedal Cyclist	0.64	0.43	33%	0.10	0.05	50%
Child Pedal Cyclist[4]	0.25	0.10	59%	0.04	0.02	60%
P2Ws[5]	0.53	0.32	41%	0.14	0.05	68%
Car Occupants	2.23	0.95	57%	0.21	0.05	77%
Child Car Occupants[6]	0.19	0.09	51%	0.01	0.00	47%

1. Before and after figures rounded to two decimal places
2. Before has been measured over 4,680 site-months
3. After period measured over 2,930 site-months
4. Small sample size means that KSI data for child pedal cyclists is not statistically significant
5. P2W = Powered Two Wheelers (includes scooters, mopeds and motorcycles)
6. Small sample size means that data for child car occupants is not statistically significant

9.4. It is estimated that traffic calming schemes in London have saved around 3,500 casualties since their introduction in the 1990's.

9.5. Road humps are an effective and relatively economical way of reducing speeds. Using DfT values for fatal, serious and slight casualties, traffic calming schemes using speed humps pay for themselves in around one year (100% first year rate of return).

Summary

(a) **Do Speed Humps Affect Delivery of Emergency Services ?**

- Road humps have only a minor influence on response times. Each hump crossed adds about 3 seconds to travel time.
- Lower response times are much more a function of general travel speeds in London.

(b) **Do Speed Humps Damage Residential Properties ?**

- The evidence is that the vibration effect is very small and not damaging.

(c) **Do Speed Humps Increase Air and Noise Pollution ?**

- For air pollution the evidence is mixed – small decreases in NOx; small increases in fuel consumption and HC.
- For noise pollution the evidence is that there are overall lower average levels of noise, but potentially higher peak noise events (skip lorries, milk floats etc).

(d) **Do Speed Humps Increase Congestion in Residential Areas ?**

- No; flows are reduced in residential areas.
- Some traffic is likely to be diverted onto the surrounding main road network. This transfer is relatively small in terms of numbers of vehicles.

(e) **Do Cars Try To Make Up Time By Speeding Between Zones ?**

- There is no evidence to support this.

(f) **Do Speed Humps Damage Cars ?**

- Not if the cars travel at an appropriate speed (less than 20mph).
- The current DfT guidance for the design of road humps takes account of current vehicle design.

(g) **Are there any Alternative, Cost-Effective Measures to Speed Humps and, if so, Which Technologies Would You Favour ? (e.g. Home Zones, Safety Camera Technology, Speed Limiters)**

- Alternative engineering measures such as cushions and chicanes can be used.
- The redesign of the streets, as in Home Zones, is a viable alternative to installing road humps, but more expensive.
- Speed cameras are capable of detecting speeds below 30mph and could be used to enforce low speeds. There are practical cost problems, as currently it is not possible to re-invest the income.
- Variable speed signs have been shown effective in reducing speeds.
- Speed limiters fitted in vehicles would be a potential solution to lowering speeds, but the necessary technology and infrastructure is likely to be some years away.

(h) **What is Your Experience of the Effectiveness of Road Humps in Preventing and Reducing the Number of Fatal Injuries and Traffic Collisions ?**

- The evidence proves conclusively that road humps lower speeds and reduce both number and severity of casualties.
- Research shows that every 1mph reduction in average speed reduces casualties by around 5%.
- Studies have shown 60% reductions in casualties for UK traffic calming schemes.
- A study of London 20mph zones has shown 57% reductions in Killed and Seriously Injured.

ANNEX A – BIBLIOGRAPHY

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