National Audit Office briefing for the Transport Select Committee: Effective road and traffic management

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Introduction

1. This document outlines matters raised in reports published by the National Audit Office (NAO) and Committee of Public Accounts (PAC) against the themes of the Committee's inquiry into Effective Road and Traffic Management. The analysis focuses on the motorway and trunk road network in line with the NAO's remit of examining central Government expenditure and delivery. We have not updated the information contained in the reports we refer to, some of which were published a number of years ago. We refer to the following NAO reports:

    - Procurement of the M25 private finance contract (2010)
    - Highways Agency: Contracting for highways maintenance (2009)
    - Department for Transport: Improving road safety for pedestrians and cyclists in Great Britain (2009)
    - The procurement of the National Roads Telecommunications Services (2008)
    - Department for Transport: Monitoring the costs of building roads in England (2007)
    - Tackling congestion by making better use of England's motorways and trunk roads (2004)

1. The prevalence and impact of traffic congestion and likely future trends

Extent and estimated cost of congestion

1. In 2004 we reported that around seven per cent (some 665 kilometres) of the 9,500 kilometres of motorways and trunk roads in England suffered heavy congestion at peak times and occasionally at non-peak times. A further 13 per cent (1,235 kilometres) of the network suffered heavy congestion on at least half the days of the year. The Highways Agency estimated at the time that congestion on its network cost industry and commerce £3 billion a year.[1]

2. In 2010 we noted that 18 per cent of total vehicle delay in England in the year to March 2010 was experienced on the M25, which had been used beyond its capacity since shortly after its opening.[2]

Impact of congestion

3. We reported in 2004 that between 1995 and 2003 average speeds on trunk roads and motorways had remained steady during the off-peak period at around 55 mph, but had fallen by five per cent in the morning peak period and by six per cent in the evening peak period. Over this period average speeds had fallen most sharply on motorways. Over a similar period (1995 to 2002) the volume of traffic on motorways had grown more quickly - by 26 per cent, compared to the average across all roads of 14 per cent.[3]

4. The Highways Agency's (the Agency's) 2008-09 survey of road users found that 30 per cent of them reported delays, a measure of congestion, up from 23 per cent in 2007-

[1] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads*, HC 15, Session 2004-05, November 2004, para 1.1 and 1.6

[2] National Audit Office, *Procurement of the M25 private finance contract,* HC 566, Session 2010-11, November 2010, para 1.1-1.2

[3] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads*, 2004, para 1.4-1.5

08.[4] However, between July 2007 and July 2008 data showed that average delays had fallen for the worst 10 per cent of journeys despite rising traffic volumes across the Highways Agency's network. We concluded the Agency's maintenance regime had made some positive contribution to this improvement. Eighty per cent of respondents to the 2008-09 survey of road users were very or quite satisfied with the Agency's performance overall, an increase of 4 per cent from 2007-08.[5]

Causes of congestion

5. In 2004 we noted that the Transport Research Laboratory had estimated that the major cause of congestion was weight of traffic (65%) with accidents and incidents (25%) and roadworks (10%) also involved. We also referred to the link between transport and economic growth noting that the underlying growth in traffic was likely to continue, driven by long-term trends of increasing wealth, rising car ownership, demographic changes and a real-terms reduction in the cost of motoring.[6]

6. Forty per cent of those experiencing delays on their last motorway or trunk road journey attributed it to roadworks, in the Highways Agency's *National Road Users' Satisfaction Survey 2008-09*, a fall of 3 per cent from 2007-08.[7]

7. In 2010 we reported that the growth in traffic volumes on the M25 (two per cent per year) was due to the lack of an alternative orbital road or public transport routes, development of outer London and cultural changes increasing car use. We noted that the Highways Agency expected the latest widening of two sections of the M25 to increase average speeds in the opening year by 10 miles per hour, and reduce the accident rate per million vehicle miles by 1.5 per cent. Its analysis showed that, taking account of traffic growth and without demand management, the overall

[4] *National Road Users' Satisfaction Survey 2008-09*, which we cited in *Contracting for highways maintenance* (2009)

[5] National Audit Office, *Highways Agency: Contracting for highways maintenance*, HC 959, Session 2008-09, October 2009, para 3.14-3.15

[6] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 1.6-1.7

[7] National Audit Office, *Contracting for highways maintenance,* 2009, para 3.14

benefits to traffic throughput would peak in 2021, six years after the expected completion date of the construction. Thereafter, benefits would fall as additional traffic fills up the road.[8]

[8] National Audit Office, *Procurement of the M25 private finance contract*, 2010, para 1.1-1.2 and 2.30

2. The extent to which the Government and local authorities should intervene to alleviate congestion and the best means of doing so

Government use of traffic management measures

8. We have reported examples where government could have done more to reduce road congestion:

- In our 2004 report *Tackling congestion by making better use of England's motorways and trunk roads* we concluded that the Highways Agency had been behind some of its overseas counterparts in adopting measures to tackle congestion such as road pricing, tidal flow, dedicated lanes, ramp metering, variable speed limits, hard shoulder running and dynamic lanes.[9] In its subsequent report on the subject, PAC concluded that the Agency's trials of traffic management measures had been poorly designed and managed, leading to inconclusive results.[10] In 2010, PAC concluded that the Agency persisted with its preferred solution of widening the M25 because of the time taken to trial hard shoulder running. Hard shoulder running was first trialled in Europe in 1996 but it wasn't until 2001 that the Agency announced its intention to trial the technique.[11] A programme of hard shoulder running became part of the Department's policy for managing motorways and major trunk roads in 2009.[12]

[9] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 2.3

[10] HC Committee of Public Accounts, *Tackling congestion by making better use of England's motorways and trunk roads,* Twenty-fifth Report of Session 2004-05, HC 134, June 2005, Recommendation 2

[11] HC Committee of Public Accounts, *M25 Private Finance Contract,* Nineteenth Report of Session 2010-11, HC 651, February 2011, Recommendation 6

[12] National Audit Office, *Procurement of the M25 private finance contract*, 2010, para 17

- Our 2004 report also noted that road pricing had been used on a few key toll roads and in congestion charge zones in London and Durham, though it was not policy then to use the measure widely. We also noted that in the first three months after the M6 Toll opened in December 2003, the Agency had found that traffic volumes fell by around 10 per cent on the M6, accompanied by reduced traffic delays and improved journey time reliability.[13]

- The Department for Transport (the Department) and the Highways Agency committed to explore demand management, a range of techniques used to reduce traffic generation, on the M25 in 2003 but we reported in 2010 that they had not made significant progress. Kellogg, Root and Brown estimated in 2002 that if the Government widened the M25 without demand management, journey times would still be 5 per cent longer in 2011 than in 1997, and reliability 16 per cent worse. [14]

Government traffic management investment decisions

9. Past NAO and PAC reports have identified areas for improvement in the way the Department for Transport made decisions about investment in congestion reducing measures:

    - In its 2007 report *Estimating and monitoring the costs of building roads in England*, PAC concluded that the then existing scheme of prioritising road schemes by region could mean that neither small low cost local schemes nor schemes of national importance would be given appropriate priority.[15]

    - The PAC's 2005 report on *Tackling congestion by making better use of England's motorways and trunk roads* noted that the lack of national targeting of resources by the Highways Agency meant that signage technology

[13] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 1.9-1.10

[14] National Audit Office, *Procurement of the M25 private finance contract*, 2010, para 2.29 and 2.31

[15] HC Committee of Public Accounts, *Estimating and monitoring the costs of building roads in England,* Fifty-eighth Report of Session 2006-07, HC 321, November 2007, Recommendation 4

in the South East had fallen behind other regions even though the South East had some of the most heavily congested roads in the country.[16]

- PAC also reported that the Highways Agency evaluated motorway and trunk road investments on the basis of business cases for individual schemes, making results highly site specific. The Committee recommended evaluating with the Treasury the broader case for traffic management interventions across the network. In supplementary evidence, the Highways Agency stated that cost-benefit evaluation suggested that small schemes and junction improvements had higher cost-benefit ratios than traffic management measures. Although the Agency said at the time that these figures should be treated with caution as they were highly site specific.[17]

- In the same report, PAC concluded that the Highways Agency had not aligned its technology strategy with its strategy for building new roads and widening existing ones, resulting in some inappropriate and potentially costly decisions which the Agency had recognised and reversed.[18]

Reducing short journeys

10. Our 2009 report *Improving road safety for pedestrians and cyclists in Great Britain* noted the Department's commitment to reversing the decline in walking and cycling but found that between 1976 and 2006 the distance people walked had declined from 248 to 201 miles per person per year and cycling had fallen from 51 to 39 miles per

[16] HC Committee of Public Accounts, *Tackling congestion by making better use of England's motorways and trunk roads,* 2005, recommendation 11

[17] HC Committee of Public Accounts, *Tackling congestion by making better use of England's motorways and trunk roads,* 2005, recommendation 9, Evidence 21

[18] HC Committee of Public Accounts, *Tackling congestion by making better use of England's motorways and trunk roads,* 2005, recommendation 10

person per year. Over the same period the average distance travelled by car had increased from 3,200 to 5,700 miles per person per year.[19]

[19] National Audit Office, *Department for Transport: Improving road safety for pedestrians and cyclists in Great Britain*, HC 437, Session 2008-09, May 2009, para 1.3

3. The extent to which road user culture and behaviour undermines effective traffic management, including the relevance to today's road users of the Highway Code

Differences in road user culture between countries

11. In 2004 we reported that the Highways Agency considered that traffic conditions and driver behaviour in England differed from those in other countries, which affected the success of measures to tackle congestion. Certain measures used in other countries to keep traffic flowing freely on a motorway – for example, allowing long queues to develop on ramp-metered slip roads even if the backlog results in congestion on local roads as seen in the USA - would not in the Agency's view be acceptable in England.[20]

Driver behaviour which increases congestion

12. PAC concluded in 2005 that poor behaviour by motorists such as occupying the middle lane unnecessarily or driving too close to the car in front caused congestion and accidents.[21] The Highways Agency's response highlighted its use of variable message signs on motorways to support different campaigns with messages such as 'Don't hog the middle lane', 'Keep left unless overtaking' and 'Keep your distance', which the Netherlands had emulated. The Agency also stated that it worked with other organisations to influence drivers' behaviour.[22]

[20] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 2.7

[21] HC Committee of Public Accounts, *Tackling congestion by making better use of England's motorways and trunk roads,* 2005, recommendation 4

[22] *Treasury Minute on the Twenty-fifth Report from the Committee of Public Accounts 2004-05*, Cm 6668, October 2005, para 13-15

4. Intelligent traffic management schemes, such as the scheme which has operated on the M42, and their impact on congestion and journey times

Traffic management scheme trials

13. In 2004 we reported on the Highways Agency's trialling and use of a number of intelligent traffic management schemes:

- Variable speed limits were then in place on 30km of the western M25 (mandatory) and on 30 per cent of the motorway network (advisory). Results from a trial on 22km of the M25 in 1995 indicated savings in journey times, smoother flowing traffic and a fall in the number of accidents. We reported that variable speed limits were generally popular among road users. Research on variable speed limits in the Netherlands had shown a five per cent increase in traffic flow and reduced congestion. In Germany variable speed limits where there were previously no speed limits had smoothed traffic flow at higher speeds and had reduced accidents by 30 per cent.

- At the time of our report, ramp metering was in use at four sites on the M6 and had been trialled on the M3 and M27. The Department had reported reductions in journey times - up to 20 minutes during peak hours at one site - following the introduction of ramp metering to the M6. The scheme was not extended at that time as the sites on the M6 were not thought to be representative and the Department had considered that the results were unlikely to be replicated in other parts of the network. Research from the Netherlands had indicated that ramp metering increases traffic flow by four per cent.[23]

- Tidal flow systems have been used in two parts of the road network (a bridge and a tunnel) in England since the 1980s. The Department's consultants concluded that tidal flow systems were beneficial where there were

[23] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 2.17-2.21

significant fluctuations in the direction of traffic over a period of time such as in and out of a city. In assessments, the Department and Highways Agency concluded that the M25 and M42 were unsuitable for tidal flow systems and, at the time of our report in 2004, had not identified any other locations where traffic flows are highly directional and therefore suitable for tidal flows. Tidal flow has been used in other countries including Germany, the Netherlands, the United States, Canada, Australia, New Zealand and France to varying extents.[24]

Applying trial results to the wider network

14. In 2010 we reported on the results of the M42 Active Traffic Management trials which showed that the scheme improved journey times by up to 24 per cent and reduced journey time variability by 22 per cent on average. The Highways Agency considered that applying hard shoulder running to sections of the M25 with a speed limit of 50 mph, as used in the first M42 trials, would offer around 35 per cent of the benefits of its proposed road widening and capital savings of 23-34 per cent. At 60 mph, it considered the scheme could produce 80 per cent of the benefits of road widening. The Agency intends the widening of the M25 to increase average speeds in the opening year by 10 miles per hour and reduce the accident rate by 1.5 per cent. These intended benefits were assessed at approximately £2.3 billion. The NAO estimated that using Active Traffic Management rather than road widening on the M25 could have produced potential cost savings of between £400 million and £700 million (12-21 per cent of the cost of the private finance widening). In 2009, following further trials on the M42 at 60 mph, the Department published a strategy for applying Active Traffic Management to a number of motorways formerly considered for widening.[25]

[24] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 2.10-2.11 and Box on page 19

[25] National Audit Office, *Procurement of the M25 private finance contract,* 2010, para 7, 3.2, 3.6 and 3.11

Investments to facilitate traffic management

15. The NAO and PAC have reported on the Highways Agency's investments in its infrastructure and technology to reduce congestion:

- In 2004 we noted the Highways Agency's expectation that its National Traffic Control Centre would reduce congestion on the motorway network by 5-6 per cent over the ten year contract by providing drivers with up to date information, leading to reduced delays and journey time savings valued at £160 million. We found that the Agency was improving the information it gave to motorists and had installed its most sophisticated technology along the M1, M6 and around the major conurbations in the North and Midlands, where there are some of the most congested motorways. It had not installed the systems on some equally heavily congested motorways in the South East, such as sections of the M25, in part because of uncertainty over future widening works.[26]

- We reported on the National Road Telecommunications Services (NRTS) programme to upgrade communications infrastructure by the Highways Agency in 2008. The programme was intended to facilitate a number of projects and initiatives including active traffic management schemes and the Agency's management of motorway traffic. At the time of our report, benefits for road users from other Agency projects dependent on the NRTS programme were beginning to be realised.[27] In its subsequent report, PAC concluded that traffic management improvements facilitated by NRTS would increase the existing capacity of motorways and so defer, but not eliminate, the need for widening.[28]

[26] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 6, 3.6 and 3.9

[27] National Audit Office, *The procurement of the National Roads Telecommunications Services*, HC 340, Session 2007-08, April 2008, para 12 and Figure 19

[28] HC Committee of Public Accounts, *The procurement of the National Roads Telecommunications Services,* Forty-sixth Report of Session 2007-08, HC 558, October 2008, Para 23

5. The effectiveness of legislative provisions for road management under the New Roads and Street Works Act 1991 and the Traffic Management Act 2004

Highways Agency traffic officers

16. In 2004 we reported on the Highways Agency's planned introduction of its own traffic officers to its motorways and some trunk roads, as allowed under the Traffic Management Act 2004. The Highways Agency had estimated that start up costs for its traffic officer service would be £73 million with annual expenses of £58 million. The Agency estimated that the measures would result in a 17 per cent reduction in motorway congestion caused by incidents, producing economic benefits valued at £67 million a year. The release of police officers from traffic management was valued at a further £20 million a year. The Agency expected that, on average, these measures would cut the time taken to clear motorways after an incident lasting 45 minutes by five minutes.[29]

[29] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads,* 2004, para 4.20 and 4.22

6. The impact of bus lanes and other aspects of road layout

Bus lanes

17. In 2004 we reported that dedicated bus lanes had been put in place in four locations on the motorway and trunk road network. Research carried out on the six kilometre M4 bus lane scheme (which had included a reduced speed limit of 50 mph) in 2000-01 had shown that the bus lane had reduced journey times in peak periods by three and a half minutes for buses and by one minute for cars, saving some 1,150 person hours each weekday valued at £750,000 a year. Off-peak journey times had increased by about one minute partly because of the speed limit change. In addition, journey times had become more reliable and there was an estimated 20 per cent reduction in accidents.[30] The M4 bus lane scheme was continued following the trial but suspended by the Department in 2010.[31]

High occupancy vehicle lanes

18. Our 2004 report also noted the results of an evaluation in 1999 of a 2 km high occupancy vehicle lane on the A647 in Leeds. The scheme had reduced morning peak journey times by four minutes for high occupancy vehicles and 1.5 minutes for other vehicles. High occupancy vehicle lanes have successfully reduced congestion in the USA. We reported that the Agency had been discouraged from adopting dedicated lanes at other sites by the unpopularity of the M4 bus lane with motorists and the media.[32]

Reducing congestion caused by slow moving vehicles

19. The Highways Agency has provided motorway crawler lanes where it has identified congestion caused by slow moving vehicles, such as heavy goods vehicles (HGVs). In

[30] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads*, 2004, para 2.12

[31] Business Plan 2011-2015, Department for Transport (DfT), November 2010

[32] National Audit Office, *Tackling congestion by making better use of England's motorways and trunk roads*, 2004, para 2.14

its Treasury Minute response to PAC's report on *Tackling congestion by making better use of England's motorways and trunk roads* the Highways Agency stated that a daytime ban on HGVs overtaking on a section of the M42 would be trialled in 2005,[33] which it subsequently made permanent.

[33] *Treasury Minute on the Twenty-fifth Report from the Committee of Public Accounts 2004-05*, para 9 and 10