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The multi-modal study transport investment plans

G. Marsden MEng, PhD, AMIHT

In 1998 the UK Department for Transport commissioned a programme of 22 studies to examine the most acute congestion problems on the English road network. The studies promised a new approach to reducing road congestion by examining the contribution that all modes of transport could make to solve these problems. The studies have provided the most convincing evidence to date that road building alone will not be able to solve congestion and pollution problems. Extra road infrastructure will, in most cases, buy a few years' respite from congestion on the inter-urban road network. The studies have proposed substantial packages of road and public transport improvements, combined with demand management and traffic restraint measures, to tackle the problems. The evidence suggests that some form of road-user charging will be required in many areas to ensure that the efficiency benefits gained from the extra road capacity will not simply be eroded by traffic growth as has been seen to date on routes such as the M25. The outcomes of the studies have prompted the Government to undertake a review of the potential for a national road-user charging system. The multi-modal studies have undoubtedly brought about a more balanced and integrated approach to transport planning. There have been quite significant changes to the roads schemes that were initially remitted to the studies and evidence to suggest that significant environmental concerns are now playing a much stronger role in decisions taken by the Department for Transport. The challenge now is to ensure that all of the major parts of the integrated strategies proposed are delivered. A failure to do so will not only reduce the benefits the proposals offer but will also devalue the multi-modal approach taken to the studies.

1. INTRODUCTION

In 1989, the then Conservative Government published a white paper, *Roads for Prosperity*,¹ setting out a £17 billion trunk road expansion programme. In 1994, the Standing Advisory Committee on Trunk Road Assessment (SACTRA) published a report, *Trunk Roads and the Generation of Traffic*,² showing that building new roads can generate extra traffic. This extra traffic eroded some of the time benefits that the expanded infrastructure was meant to provide and brought into question the cost-benefit analysis justification for parts of the programme. Concerns about the generation of extra traffic,

combined with affordability constraints and greater awareness of the environmental consequences of constructing so many new roads, led to a sharp reduction in the programme.³ By 1997, the roads programme had been cut back from 500 schemes to 147 schemes, at a capital cost of £6 billion.

The new Labour Government of 1997 produced a white paper on transport, *A New Deal for Transport: Better for Everyone*,⁴ with a key theme of integration between transport modes and across policy areas to make the best use of our existing transport infrastructure. A daughter document on the trunk road programme, *A New Deal for Trunk Roads in England*,⁵ reviewed the programme to provide a new direction and a more stable pattern of investment. Of the 147 schemes in the roads programme inherited by the Labour Government, decisions were taken on 14 schemes in July 1997. A further 37 schemes were approved in 1998 to be taken forward as part of the Highways Agency's 'targeted programme of improvements' costing £1.4 billion (1997 prices). A greater emphasis was also placed on trunk road maintenance to remove the maintenance backlog. The remaining transport problems not addressed by the targeted programme of improvements were to be analysed in a new programme of 27 studies which would be either road-based studies, which focused on particular problems on the road system, or multi-modal studies, which take a view on how all modes can contribute to the solution for the transport problem identified.

The studies were to be undertaken using the new approach to appraisal (NATA) focusing on five criteria⁶

- (a) integration
- (b) safety
- (c) economy
- (d) environmental impact
- (e) accessibility.

NATA should enable a balanced decision to be taken based on a range of quantifiable and non-quantifiable outcomes expected from a project, moving away from an approach dominated by economic cost-benefit analysis, although this retains an important role.

This paper describes the multi-modal study process and presents a review of the expenditure plans and forecast policy outcomes for the Government's two key indicators of

congestion and pollution. It reports on the 20 studies that completed their final reports by January 2004.

2. THE STUDIES

The Department for Transport (then the Department of Environment, Transport and the Regions) issued a report, *Guidance on the Methodology for Multi-Modal Studies* (GOMMMS), in March 2000.⁷ It sets out the aim of the studies, namely to 'investigate problems on or with all modes of transport and to seek solutions to those problems'. The studies are to develop a range of options consisting of specific schemes for each mode. The studies are to be used by regional planning bodies in developing and reviewing their regional transport strategies as set out in Planning Policy Guidance Note 11: Regional Planning. These links are shown in Fig. 1.

As the initial programme of multi-modal studies came from the 1998 review of the roads programme, each of the studies was asked to reconsider a number of trunk road problems and to review the previous recommendations made for upgrading the road infrastructure. The studies were to examine the contribution that all modes could make to solving the problem. The Department for Transport proposed 22 studies, which have been let in three stages. The progress of each of the studies is shown below in Table 1. Fig. 2 shows the geographical coverage of the studies.

The studies are diverse in nature, size and therefore complexity. Smaller studies such as the Cambridge to Huntingdon study (CHUMMS) examined traffic patterns around a major corridor between two urban centres, a distance of about 30 km. This can be compared with the south-west area study (SWARMMS) which examined travel from the western edge of the M25 along two major corridors to Cornwall in the south-west, incorporating a strategy for Bristol. While the studies are different in nature, the guidance issued by the Department for Transport set out a number of processes that each study should follow as shown in Fig. 3.

The guidance for the studies suggested that the studies should be 'objectives-led', but noted that this approach was more difficult for the public to understand than a problem-led approach. In reality, a blend of both approaches appears to have been taken in most studies. A series of objectives should

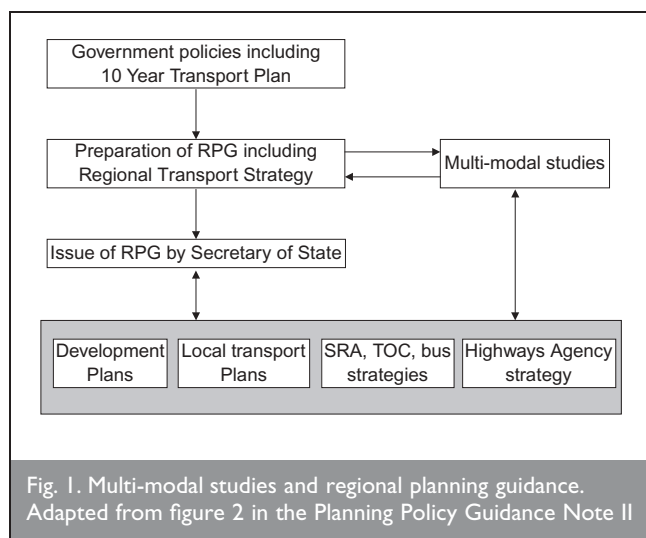


Fig. 1. Multi-modal studies and regional planning guidance. Adapted from figure 2 in the Planning Policy Guidance Note II

be developed, consistent with the national transport objectives⁴ but which reflect local or regional concerns. The objectives 'are then used to identify problems by assessing the extent to which current or predicted future conditions, in the absence of new policy measures, fail to meet the objectives'.⁷ Strategies are then developed to meet the objectives. The south-east Manchester study for example defined five core objectives⁸

- (a) the promotion of environmentally sustainable economic growth
- (b) the promotion of urban regeneration
- (c) the improvement of amenity, safety and health
- (d) the enhancement of the regional centre, town centres and local and village centres and the airport
- (e) the encouragement of the community and cultural life of neighbourhoods, and encouragement of social inclusion.

All of the studies compared a range of plan options at an early stage. The options comprised a full range of potential transport solutions, including measures identified through the consultation process. The most promising elements of the options were then refined into a smaller number of final options for more in-depth appraisal. In the first round of plan option assessment each study put forward a 'public transport improvement' option. Very significant levels of public transport investment were included in these scenarios with only minimal road expansion. In addition, the studies each included road pricing and travel demand management measures (such as commuter travel plans) to differing degrees. None of the studies was able to reduce the traffic problems that were the genesis for the studies without some combination of road and public transport improvements and the application of traffic restraint and demand management measures.

After the initial strategy appraisal, final strategies were worked up in more detail by the consultants, setting out a programme of capital and revenue spending for the next 10 to 30 years. At this stage, the scheme designs and the costings are only approximate although the guidance stated that the analysis of options should be 'sufficiently detailed to ensure that robust decisions are made'.⁷ Each element of the recommendations has to go through a further round of assessment and approval by either the Highways Agency, the Strategic Rail Authority (SRA) or local authorities and central government before it can be approved and built.

The Regional Planning Body then considers the final strategy as part of its development of regional transport and planning policy. It puts forward its recommendations to the Secretary of State who then considers the outcomes and recommends which schemes should be worked up towards implementation. Two Regional Planning Bodies have added schemes to the recommendations of the consultants which have been shown to offer poor value for money or to be environmentally damaging. The A1MMS determined that dualling of the A1 from north of Newcastle to Berwick offered worse value for money than selective widening of the A1 and extra safety schemes. However, the North East Regional Assembly proposed the full dualling option. Two options were proposed by the South West Regional Assembly for routes into Devon. The London to South-West and South Wales study had recommended only one route on environmental grounds. In

Study	Acronym	Study report to Regional Planning Body	Report received by Secretary of State	Decision by Secretary of State
Access to Hastings (A21 & A259)	A2H	December 2000	February 2001	July 2001
Cambridge to Huntingdon (A14)	CHUMMS	August 2001	October 2001	December 2001
South-east Manchester (Stockport, Manchester Airport Link West, Poynton)	SEMMMS	September 2001	December 2001	March 2002
West Midlands area (M5/M6 & M42 between M40 & M6)	WMAMMS	October 2001	Autumn 2002	July 2003
West Midlands to North-West (M6)	MIDMAN	May 2002	Summer 2002	December 2002
London to South-West & South Wales (A303, M4)	SWARMMS	May 2002	Summer 2002	December 2002
A1 (north of Newcastle)	A1MMS	May 2002	Summer 2002	December 2002
North/south movements in the East Midlands (M1 jns 21–30)	M1MMS	May 2002	Autumn 2002	December 2002
Hull (east/west) corridor (A63 and A1033 to Port of Hull)	HUMMS	July 2002	November 2002	July 2003
A453 (M1 to Nottingham)	A453	August 2002	Autumn 2002	December 2002
South coast (Southampton to Folkestone coastal corridor—M27, A27 & A259)	SoCOMMS	September 2002	November 2002	July 2003
South & West Yorkshire multi-modal study (M1 J30 to A1 West Yorks/M18/M62 & A1(M))	SWYMMS	September 2002	December 2002	July 2003
London to Ipswich (A12)	LOIS	December 2002	Spring 2003	July 2003
Tyneside area (A1/A19)	TAMMS	November 2002	Spring 2003	July 2003
ORBIT—transport solutions around London (M25)	ORBIT	November 2002	Spring 2003	July 2003
Thames Valley (London to Reading—M4)	TVMMS	January 2003	Spring 2003	July 2003
M60 junctions 12_18 (west to north Manchester)	M60JETTS	January 2003	Spring 2003	July 2003
London to South Midlands (A1, M1, M11, A5 & A421)	LSM	February 2003	Spring 2003	July 2003
Norwich to Peterborough (A47)	N2P	March 2003	Spring 2003	July 2003
West Midlands to East Midlands (A42/M42 to M6 corridor & M69 & A38)	WMEMMMS	August 2003	November 2003	
A52 corridor (Clifton Bridge to Bingham)	A52	March 2004	June 2004	
A34 north from Southampton	A34	April 2004	—	

Table 1. Current position of multi-modal studies (February 2004)

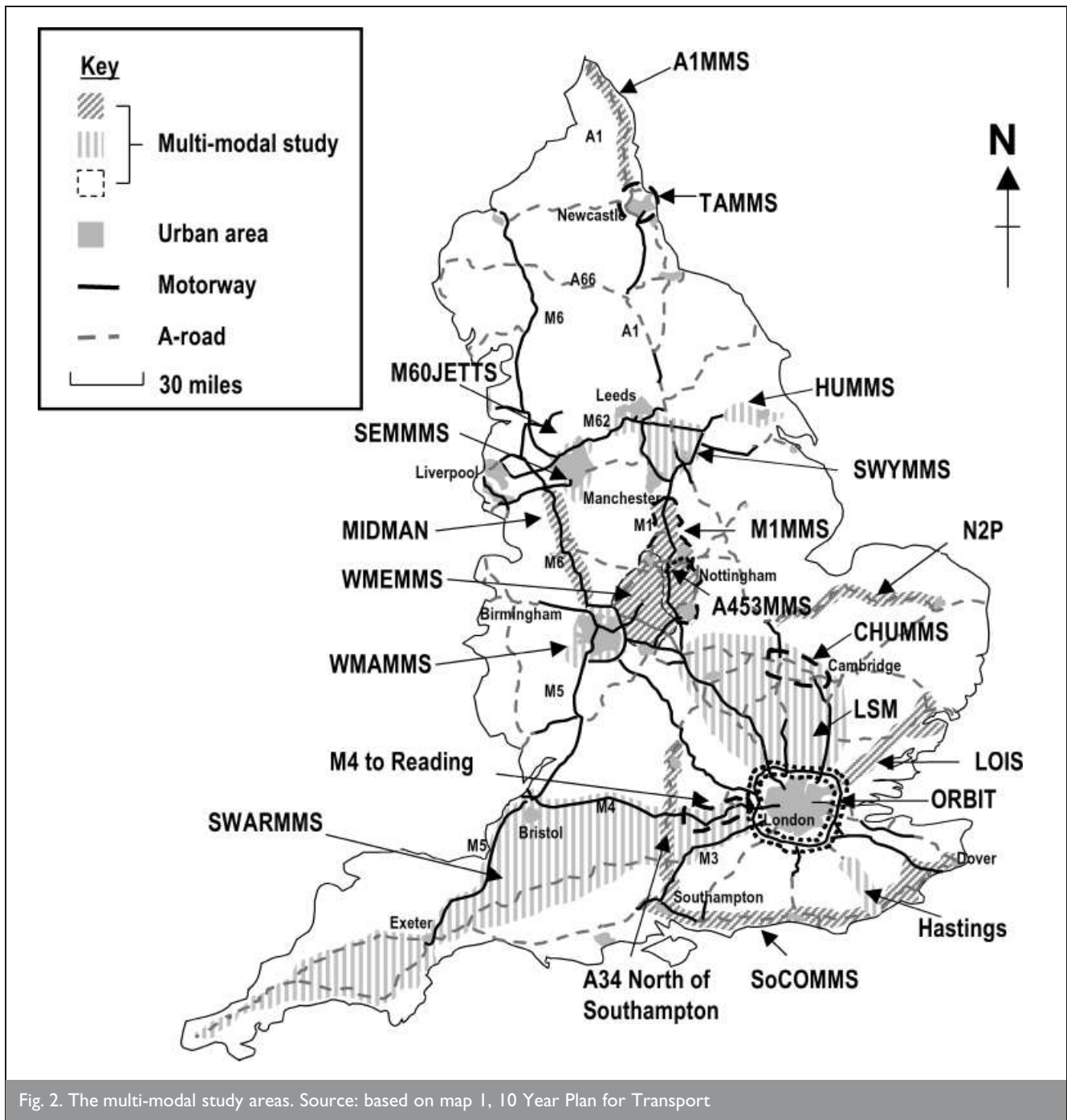


Fig. 2. The multi-modal study areas. Source: based on map 1, 10 Year Plan for Transport

late 2004, the Secretary of State ruled that only one route, the least environmentally damaging, should be upgraded.

3. THE SOLUTIONS

The studies varied significantly in the balance of road, public transport and demand management solutions put forward. The different nature of each study makes direct comparison difficult. Overall, however, the balance is significantly towards investment in public transport, although new and expanded road schemes form an essential part of every strategy. Most of the road schemes remitted to the studies were recommended in the final strategies although often in a scaled-down format (see Table 2 for further examples).

For example, the A6(M) Stockport North-South Bypass, A555 Manchester Airport Road Link and A555/523 Poynton Bypass remitted to the south-east Manchester study were all

recommended. The scale of the schemes was reduced to include at-grade rather than grade-separated junctions and the schemes were envisaged as being introduced alongside reallocation of road space elsewhere as part of the public transport strategy.

Considerable expansion of the motorway network was proposed. The largest scheme is the parallel widening of the M6 to dual four lanes between junctions 11a and 19. Other important schemes include the expansion of the M42 between junctions 3a to 7, the widening of the M1 to four lanes along much of the route as recommended in three different studies (London to South Midlands, north-south movements in the East Midlands and the South and West Yorkshire multi-modal study) with the section around Nottingham expanded to dual five lanes. The M25 ORBIT study recommended expanding a number of sections from dual three to dual four lanes as shown in Fig. 4. In ORBIT and the South and West Yorkshire study,

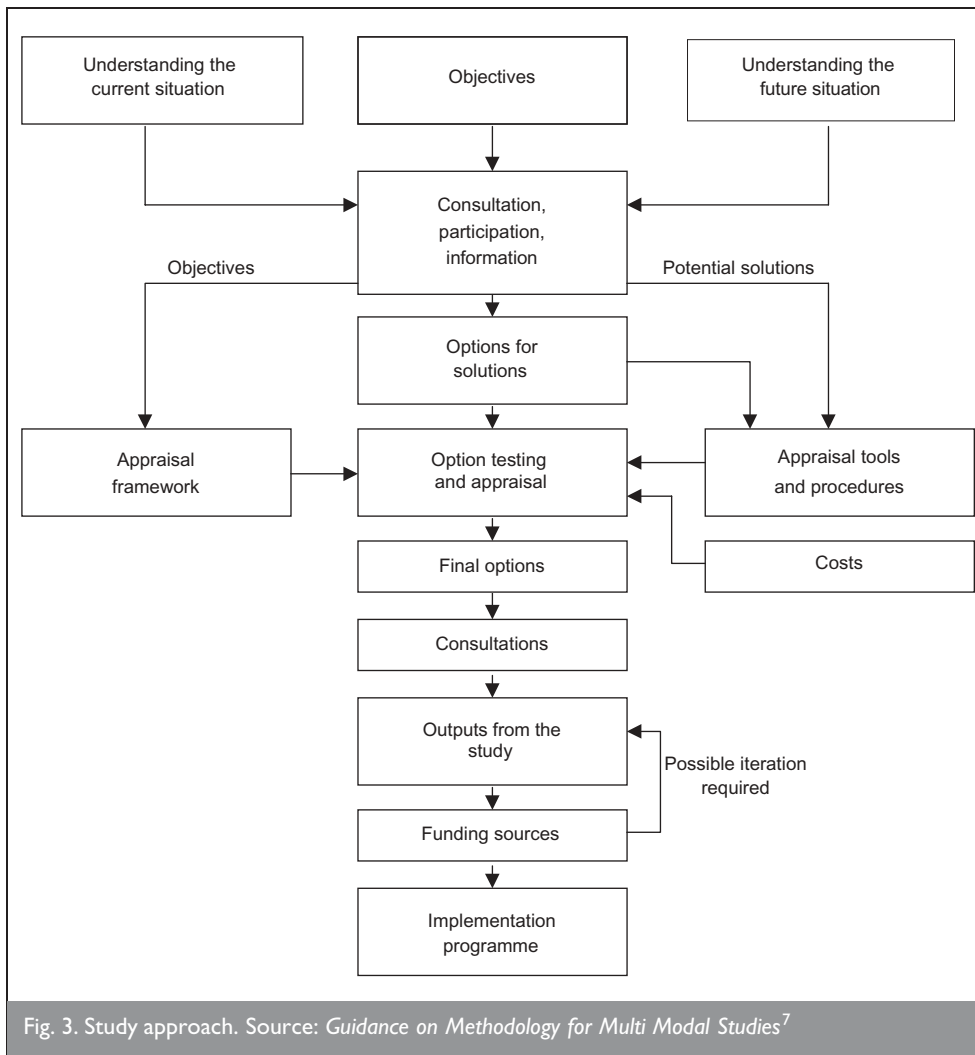


Fig. 3. Study approach. Source: *Guidance on Methodology for Multi Modal Studies*⁷

the expansion was linked to the introduction of measures to restrain traffic demand, in particular area-wide road-user charging. The road improvements were designed to go hand in hand with the restraint measures to ensure that the benefits provided by the extra capacity were not eroded.

The public transport element of the strategies was dominated by rail including new infrastructure, rolling stock and enhanced service frequencies. Examples include the electrification of the Hastings–Ashford railway, reopening the Sandbach–Northwich rail line and the introduction of ‘turn-up and go’ frequency rail services in the East Midlands. The list of projects in the SRA’s 2002 Strategic Plan was assumed to be part of the ‘do nothing’ assessment and the recommendations were therefore additional. The studies also recommend an expansion of light rapid transit (LRT) schemes for large cities such as Manchester, Birmingham, Bristol, Nottingham and Leicester. The M1 in the East Midlands study (M1MMS) noted, however, that a lack of short-distance urban flow data made the justification of further LRT schemes difficult. Smaller cities and towns such as Hull and Cambridge proposed strategies based on guided busways. Many of the studies proposed increased bus priority although the detail and sometimes the location of the schemes was mostly outside the scope of the studies.

Table 3 shows the breakdown of expenditure between road and public transport for all of the studies. Fig. 5 shows the total

expenditure breakdown recommended by the studies for road, rail and other public transport and Fig. 6 shows total expenditure proposed for each of the studies by decade.

The total capital expenditure recommended by the 20 studies examined is just over £28 billion. The revenue support requirements of the projects are less well defined. However, the Department for Transport estimates the requirement to be approximately £50 million per annum per study based on the first ten studies to report.⁹ This is split almost 50:50 between rail and local public transport scheme support and could represent an additional revenue requirement of £1.1 billion per year over current support levels. The Government’s 10 Year Plan investment strategy for transport provided for £121 billion of capital investment (of which £56.3 billion was from the private sector) and £59 billion in

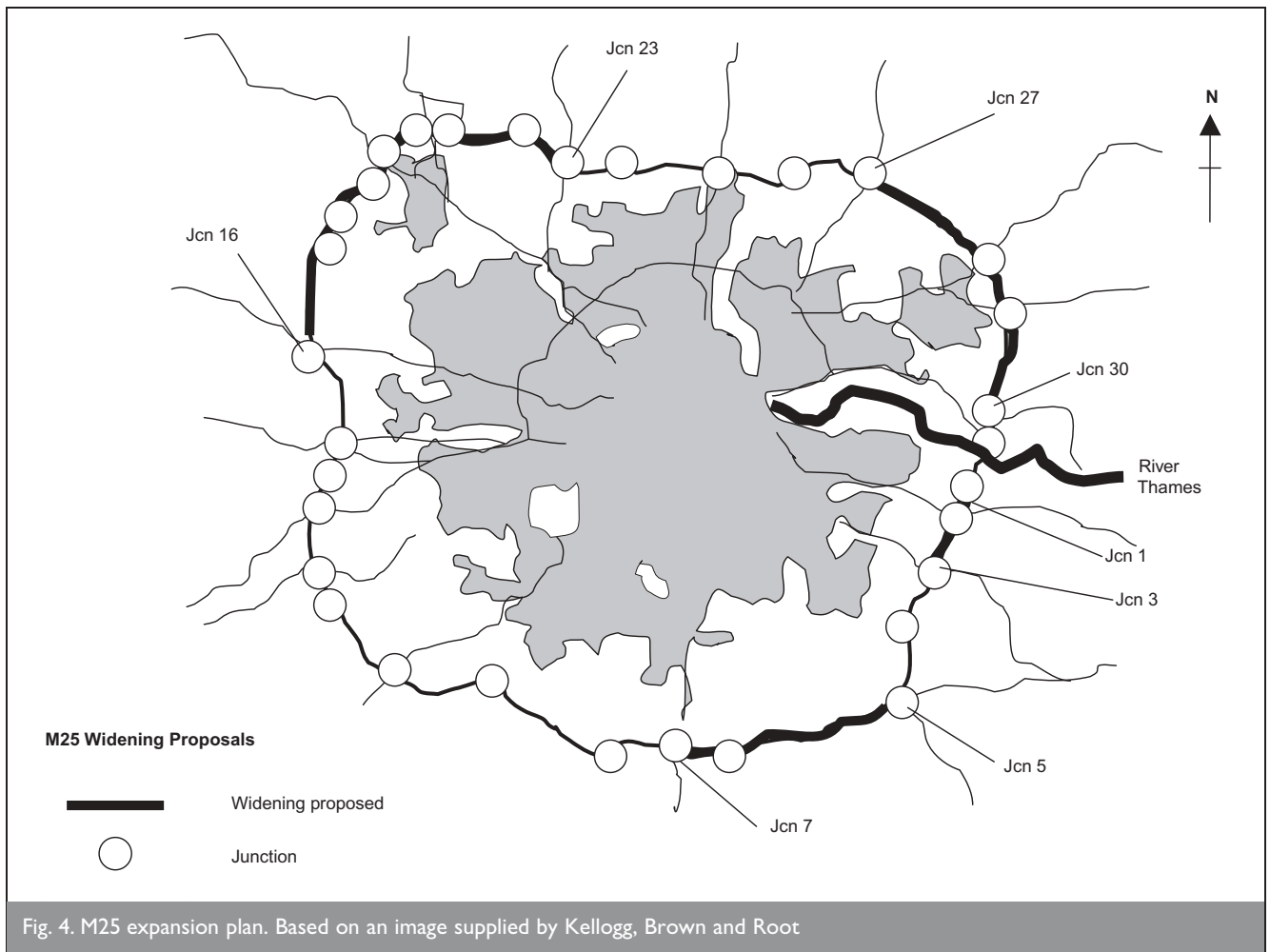
revenue support.¹⁰ Total revenue support was expected to increase by £1 billion per year, although only £0.1 billion of this was earmarked for rail and there are existing pressures for this budget.¹⁰ The Strategic Rail Authority recently had its revenue support cut by £312 million so the final revenue support figures are unclear.

On the face of it, the £12 billion of capital schemes recommended for the period to 2011 is affordable. However, the recommendations from the multi-modal studies are additional to the base-case or ‘do minimum’ scenario. This has been one of the key areas of inconsistency in the multi-modal study process. The studies based their assumptions on existing spending plans from the Highways Agency, SRA and local authorities (through the Local Transport Plans). However, while the Highways Agency was largely waiting for the decisions from the studies to fill its forward programme for major schemes, the rail budget was already more than fully allocated. Projects such as the upgrading of the West Coast and East Coast Main Line, Crossrail 1 and 2 and Thameslink 2000 were all part of the SRA’s 2001 Strategic Plan. Such significant projects appear to have more than swallowed the capital funding budget of the SRA. The SRA has therefore made it clear that it does not have the funding to support most of the multi-modal study outcomes before 2010 at the earliest.¹¹

The affordability of some of the local authority related schemes must also be questioned. While the 10 Year Plan allows for a

Study	Schemes remitted	Study and Regional Planning Body recommendations	Department for Transport decision and notes
Hastings	A259 Pevensey–Bexhill improvement A259 Bexhill and Hastings Western Bypass A259 Eastern Bypass A21 Tonbridge Pembury dualling	Withdrawn Recommended Recommended On-line dualling of A21	The Secretary of State rejected the case for the eastern and western bypasses on the grounds that the roads would not guarantee the regeneration benefits expected and that the environmental cost would be high. The A21 dualling was approved.
CHUMMS	A14 Improvement (A1 to M11 jcn 14)	On-line widening of A14 to dual three lane New bypass south of Huntingdon Extra link and slip roads at jcn 13 and 14 of M11	The Department for Transport accepted the findings of the study. On-line widening was preferred to a new route. The new bypass is to be accompanied by reallocation of road space to public transport. The strategy also features a guided busway between Cambridge and Huntingdon.
SEMMMS	M11 jcn 14 improvement A6(M) Stockport North–South Bypass A555 Manchester Airport Road Link A555/523 Poynton Bypass	Scaled-down version recommended Scaled-down version recommended Scaled-down version recommended	All three schemes were accepted subject to more detailed proposals. The schemes were all at a reduced scale (e.g. at-grade junctions rather than grade-separated) to that initially suggested. The bypasses are to be accompanied by road space reallocations although the detail of this was limited. Provisional acceptance of the Alderley Edge Bypass was also given. The Highways Agency was asked to look again at the M60/M67/A57 Denton interchange.
MIDMAN	M6 widening to four lanes jcn 11a to 19 A556(M) improvement (M6 to M56)	Recommended Further study required	The four-lane parallel widening of the M6 was recommended as remitted and approved by the Secretary of State. A five-lane scheme performed better in the cost–benefit analysis and ‘no widening’ rejected on level of service and diversion concerns.
M1MMS	M1 widening proposals Kegworth A6 Bypass	M1 21a to 23 widened to four lanes, 24 to 24a four lanes, 24a to 27 five lanes, 27 to 30 four lanes, 28 to 30 additional crawler lanes Recommended	Both schemes were approved in principle by the Secretary of State. The study also proposed bypasses of Glapwell and Pleasley on the A617 which were also approved in principle. The study also proposed a fourth crossing of the River Trent in Nottingham. However, this is being considered separately in the A52 study and was not therefore considered at this stage.
HUMMS	A63 Castle Street on-line improvements	Modified scheme recommended	The scheme recommended is a more pedestrian-friendly version of the original scheme, reducing severance. Other options are constrained by geography of the area. The Secretary of State has asked the Highways Agency to investigate the proposals further but accepts that this is a preferred option.
SOCOMMS	A27 Arundel Bypass A27 Selmeiston Bypass A27 Wilmington Bypass A259 Bexhill–Hastings	Recommended Recommended Recommended Recommended as link road	The Secretary of State did not support the three bypasses proposed nor the proposed tunnels through Worthing and Lancing on environmental grounds. The Secretary of State approved widening of the M27 between junctions 3 and 4 and the addition of a climbing lane between junctions 11 and 12. Other schemes to upgrade the A27 between the M27 and A3(M) and the A2 near Dover were suggested for longer-term development. The A259 scheme requires further development due to adverse environmental impacts (see Hastings study).
WMAMMS	M42 between M40 and M6 M5/M6 through the conurbation Stourbridge and Wolverhampton Western Bypass	Dual five lanes plus hard shoulder jcn 3a to 7, 3 to 3a dual four lanes, 1 to 3 no widening M5 hard shoulder running. M6 no expansion (raised section) Scaled-down version	The Secretary of State supported the enhancement of capacity on the M42 but asked the Highways Agency to review the proposals which may be over and above the capacity required. The M5 hard-shoulder running proposals were approved in principle subject to the Highways Agency demonstrating that this option was workable and safe. The Stourbridge and Wolverhampton Western Bypass was rejected and support given to a wider Black Country regeneration study. Recommendations for a motorway standard link between the M54 and the M6 toll were also made and the Highways Agency tasked to investigate further.

Table 2. Sample outcomes of road schemes remitted for review



Study	Duration: years	Road: £ million	Public transport: £ million	Other: £ million
A2H	20	24	66	0
CHUMMS	15	192	56	13
SEMMMS	20	250	810	70
WMAMMS	30	1052	6058	560
MIDMAN	30	1021	615	8
SWARMMS	15	432	2380	55
A1MMS	30	137	80	2
M1MMS	20	621	1082	90
HUMMS	15	137	137	17
A453	20	62	303	33
SoCOMMS	30	594	410	99
SWYMMMS	20	676	0	11
LOIS	15	406	635	0
TAMMS	15	509	644	25
ORBIT	10	800	0	50
TVMMS	20	305	835	10
M60JETTS	20	227	40	1
LSM	30	1293	2868	0
N2P	25	179	15	11
WMEMMMS	30	1011	5	1
Total		9228	17039	1056

Table 3. Capital spending plans from studies

ask for an increase from £80 million per year to £350 million per year (over 300%) to fund their programme of improvements.⁹ The Department for Transport recently announced an allocation of £1 billion for the authorities up to 2010.¹² The Secretary of State for Transport told the House of Commons Transport Select Committee: 'Had I accepted everything in every single multi-modal study that came my way already I would probably have spent more than I would get for 20 years never mind ten years.'¹³

Funding shortages clearly impact on the ability to deliver the fully integrated solutions proposed. This is likely to reduce the benefits attained from the proposals.

47% increase in capital funds by 2010, the West Midlands area study recommendations have led the local authorities there to

The impacts of this will vary from study to study and are considered further in the subsequent section on integration.

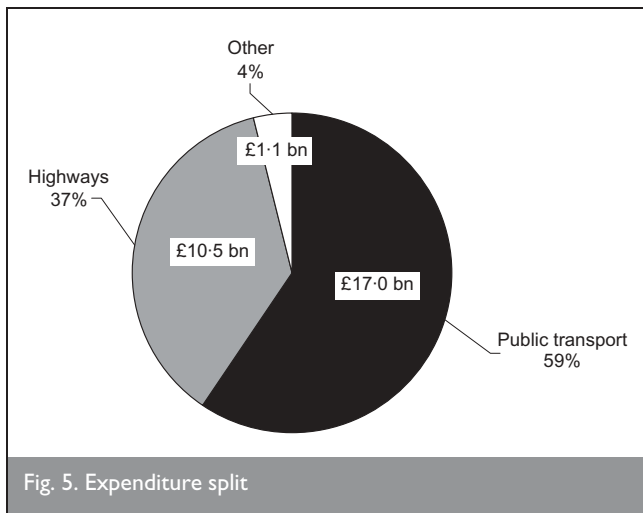


Fig. 5. Expenditure split

4. ROAD-USER CHARGING AND DEMAND MANAGEMENT

The Government's 10 Year Plan for transport states that the conclusions of the multi-modal studies with respect to charging will be one of the factors feeding into the decision on the need for charging on the inter-urban road network. The studies were instructed to assume that any such charging could not practically be introduced before 2010.¹⁴ Most of the studies have examined a range of assumptions on the introduction of inter-urban tolling (an entry charge for motorway use), local congestion charging or workplace parking levy schemes and area-wide charging. The study recommendations on charging are summarised in Table 4. It is important to recognise that the

recommendations are those of the study team and do not necessarily represent accepted policy of the local authorities concerned.

4.1. Local charging

The different nature of each of the studies makes direct comparison of the findings on local charging difficult. However, some form of local charging scheme has been recommended or assumed for all of the major urban areas. A number of studies did not recommend local charging but tested the robustness of their recommendations both with and without charging, such as the south-east Manchester study.

4.2. Inter-urban and area-wide charging

The majority of the major motorway corridor studies found that introducing road charging for inter-urban trips had a significant impact on traffic levels, as would be expected. The resulting study recommendations did, however, vary considerably. The M6 study was the only study to recommend tolling a motorway with an entry charge. All of the other studies that investigated tolling of the motorway alone found that it led to unacceptable levels of diversion onto already congested, less safe, alternative routes, which conflicted with the other study objectives. The approach favoured by the majority of the studies was therefore to support the introduction of area-wide charging. Different levels of charges were tested, varying from 1 p/km to 44 p/km depending on levels of congestion and time of day. The South and West Yorkshire and M25 ORBIT studies both designed the road expansion schemes on the assumption that area-wide road-user charging would be introduced in parallel with the road

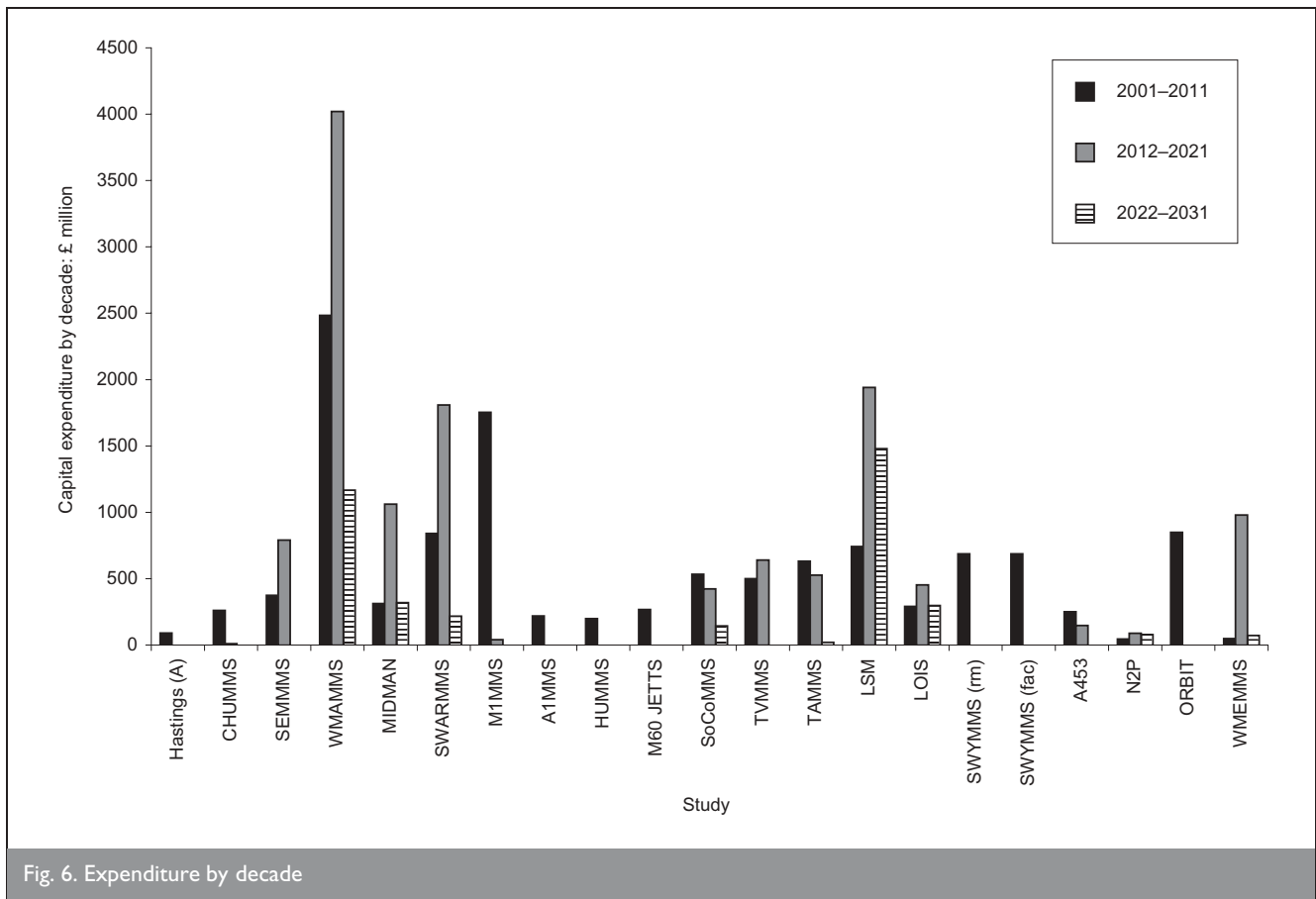


Fig. 6. Expenditure by decade

Study	Urban charging schemes	Date	Inter-urban/area-wide charging	Date	Comments
A2H	×	—	×	—	Not considered due to regeneration objectives Examined a £3 urban charge for Cambridge but not adopted
CHUMMS	×	—	×	—	
SEMMMS	×	—	×	—	Tested 10 p/km area-wide charge but rejected. Schemes still viable
WMAMMS	✓	2005–2015	✓	2020	
MIDMAN	✓	2011	?	2021	Urban charging £2.50 in Birmingham, Wolverhampton, Solihull, Walsall, Merry Hill then area-wide charging 1 to 22 p/km Urban charging in West Midlands, Merseyside, Greater Manchester (all £5), Stoke and Newcastle-under-Lyme (£2.50). Inter-urban charge dependent on congestion reappearing —£2.50 entry toll for M6
SWARMMS	✓	2005–2010	×	—	
A1MMS	×	—	×	—	Bristol City congestion charge supported. Tested area-wide charge 6 p/km Tolling unlikely to meet safety and capacity concerns
M1MMS	✓	2010	×	—	
HUMMS	×	—	×	—	Workplace parking levy in Nottingham, Derby and Leicester: 6 p/km peak toll and 3p/km off-peak tested but rejected due to lack of political will Lack of suitable alternative routes made charging for small area not viable
A453	✓	2011	×	—	
SoCOMMS	✓	2008–2017	×	—	Urban charging cordon in Southampton, Portsmouth and Brighton and workplace/out-of-town retail parking charges 4.5 p/km area-wide charge all day increased to 5 p/km by 2021
SWYMMS	×	—	✓	2011	
LOIS	×	—	?	Post-2016	Supported if introduced across UK 6.5 p/km to 44 p/km dependent on area £1.40 toll on all river crossings
TAMMS	✓	2016	×	—	
ORBIT	×	—	✓	2011	Area-wide charging of 6.5 p/km in 2011 rising to 9.0 p/km in 2021 6.5 p/km area-wide charge provided congestion relief but not core strategy
TVMMS	×	—	×	—	
M60JETTS	✓	2011	✓	Post-2011	Area-wide charge in Greater Manchester and motorways nationally 10 p/km after the main infrastructure improvements completed
LSM	×	—	✓	2016	
N2P	×	—	×	—	Not recommended 6 p/km on strategic roads and 3 p/km on local roads combined with parking controls in urban centres
WMEMMMS	×	—	✓	2015–2021	

Table 4. Road-user charging recommendations

widening to ensure that the benefits of the road improvements are not eroded by extra traffic attracted to the route. The South and West Yorkshire study found that the cost-benefit ratio was 9.6 times higher for the option with area-wide charging compared to the option without.¹⁵

Other studies (e.g. the London to Ipswich A12 study, LOIS, and the Thames Valley London to Reading M4 study, TVMMS) were less committal about the introduction date for charging. The West Midlands to East Midlands study found that an area-wide charge of 6 p/km on strategic roads and 3 p/km on local roads (introduced post 2015) would reduce traffic by 3% by 2021. Some of the smaller studies and studies with less heavily trafficked routes did not propose any form of charging.

4.3. Behaviour change

The studies have all examined the extent to which behaviour change initiatives (such as individualised marketing, commuter travel plans) could reduce travel demand. The results again varied, largely being dependent on the nature of the study area,

but also because this is a relatively new field and there is no agreed view on the long-term impacts of these measures. In February 2002, the Department for Transport published a report by Halcrow on the likely impact of these so-called 'soft factors' on travel demand.¹⁶ While this may help in standardising expectations from these initiatives, the impacts from their long-term and widespread application are not known and must be monitored to ensure that the plans are based on sound assumptions.

The large city studies such as the West Midlands Area (M5/M6 and M42 between M40 and M6) study (WMAMMS) and the South-East Manchester (Stockport, Manchester Airport Link West, Poynton) study (SEMMMS) have suggested heavy investment in behaviour change. These studies suggest that these measures will contribute more to the success of the strategy than the infrastructure improvements, a position that would have been inconceivable five years ago. WMAMMS expects behavioural change to achieve a 10% reduction in car trips by 2011 and 20% by 2031. The larger motorway studies

have been less consistent in their expectations. The Thames Valley study, London to South-West and South Wales and M6 studies all estimated that behaviour change could reduce demand by 5–10% over the next 10 to 15 years. The ORBIT study found that even a substantial increase in home working would have a negligible impact on traffic volumes using the M25.

5. OUTCOMES

The 10 Year Plan for transport was developed 'to tackle congestion and pollution by improving all types of transport—rail and road, public and private—in ways that increase choice'.¹⁰ The studies were developed to address 'some of the most difficult and intractable congestion and safety problems on the strategic road network'.¹³ It would therefore be reasonable to expect the studies to contribute significantly to the Department for Transport's target of reducing congestion from year 2000 levels on the inter-urban road network. Strategies that reduce congestion, encourage modal shift and in some cases reduce the number of vehicle kilometres travelled would also be expected to have beneficial impacts for toxic air pollution and carbon dioxide levels. The expected impacts from the 10 Year Plan are shown in Table 5.

Table 6 shows the results of the congestion forecasts from those studies that had reported by December 2002 and had used the Government's 10 Year Plan congestion definition.

The results assume that all of the road and public transport schemes are affordable and implemented on time. Even with this assumption, it is clear that the studies have not been able

to produce strategies that will reduce congestion, particularly in the long run compared to current levels. While it is standard practice to compare the outcomes for any given year with those from the 'do minimum' scenario (against which the strategies show improvements) it is instructive in this instance to compare performance to year 2000 levels as that is the baseline used by the Department for Transport in setting its congestion reduction target. It is noticeable that there is only a very small forecast increase in congestion in the M25 study by 2011. This however, assumes that an area-wide road user charging scheme is introduced. The M1 study achieves a cut in congestion although this is not sustained over the period beyond 2010 due to rising traffic levels. It has been suggested by Professor Goodwin, that the Government's definition of congestion is flawed and likely to lead to very large percentage changes in congestion which correspond to small changes in actual travel times. However, for this paper, the Government's definitions have been accepted and used.

Most of the strategies proposed were able to demonstrate a reduction in the number of houses affected by local air quality and noise problems. A number of bypasses were proposed which contribute to this by the removal of traffic through populated areas. However, the trends for carbon dioxide emissions are more concerning. The studies assumed that vehicles would become more efficient in line with the voluntary agreements with world car manufacturers as set out in the Transport Economics Note.¹⁷ Despite this, a number of studies showed a rise in carbon dioxide emissions compared to 2000 levels as shown in Table 7.

Indicator	Units	Year 2000 level	2010 baseline	2010 with plan	Change with plan
Congestion (inter-urban)	% change over 2000	100	+28	−5	−33
Carbon dioxide	MtC	31.0	31.7	30.1	−0.9
Nitrogen oxides	kt	501	213.0	208.0	−293
Particulates	kt	20.3	11.1	11.0	−9.3

kt = kilotonnes; greenhouse gas emissions are expressed as million tonnes of carbon equivalent (MtC). One tonne of carbon is equivalent to 3.7 tonnes of carbon dioxide which is the molecular weight of carbon dioxide to the atomic weight of carbon. The figures differ from those in the Transport Select Committee report. The Government's response to the report points out that the units in the Select Committee report are inconsistent

Table 5. 10 Year Plan forecasts

Study	Congestion in 2010: % change from 2000 levels	Congestion in 2021: % change from 2000 levels
North–south movements on M1 in East Midlands	−1.2	+5
M6 Midlands to Manchester	+33	n/a
Tyneside area study	+18	n/a
Tyneside area study (inter-urban roads)	+2	n/a
Hull	+27	n/a
M25	+3	+21.5
London to Ipswich	+28	n/a
South and West Yorkshire	+20	+48

Table 6. Congestion forecasts from eight studies compared to year 2000 levels. Source: Transport Select Committee⁹

The analysis from the nine studies shows that there will be a net increase in carbon dioxide emissions of approximately 0.6 MtC by 2016 (it is difficult to be exact due to the different years for which data are presented). This compares to the 0.1 MtC increase forecast in the 10 Year Plan as a result of extra traffic. The South and West Yorkshire study and the West Midlands area study expect carbon dioxide emissions to remain at base-year levels while the ORBIT study is expected to achieve a reduction. As noted previously in Table 4, these studies have all proposed significant traffic restraint measures with local and area-wide charging introduced at an early date. The three studies showed that, were charging not to be introduced, net emissions would increase in each study such that the overall increase from the nine studies would

Study	Base year	CO ₂ emissions: MtC	Forecast year	CO ₂ emissions: MtC	Change in CO ₂ emissions: MtC
A1 north of Newcastle	2001	0.08	2011	0.09	+0.01
M6 West Midlands to North-West	2000	3.64	2011	4.12	+0.48
		0.00	2031	5.32	+1.68
Tyneside area	2000	0.52	2011	0.58	+0.06
South coast corridor	2000	1.61	2016	1.78	+0.17
South & West Yorkshire multi-modal study	2000	1.13	2016	1.12	-0.01
Hull (east-west) corridor	2000	0.07	2016	0.10	+0.03
West Midlands Area	1999	0.98	2011	0.98	+0.01
		0.00	2031	1.05	+0.07
ORBIT (M25)	1997	5.30	2011	4.92	-0.38
London to Ipswich	1997	0.21	2011	0.39	+0.18

Table 7. Carbon dioxide forecasts from nine studies compared to year 2000 levels. Source: Transport Select Committee⁹

rise from 0.55 MtC to 1.95 MtC.⁹ This compares to an overall reduction of 0.9 MtC that the Department for Transport believed would be achieved by the whole of the 10 Year Plan in its revised forecasts of December 2002.¹⁸

Again, it is important to put these results in context. All of the studies achieved a reduction in carbon dioxide emissions compared to the 'do minimum' scenario. They therefore registered as a positive impact in the Department's appraisal summary tables. The question however, is whether the absolute levels of carbon dioxide emissions are consistent with the Government's commitments to reduce carbon dioxide emissions, not whether the strategies are 'not as bad' as they would have been. This appears to be a significant issue that remains to be addressed. Had the studies been given an objective to reduce carbon dioxide emissions then it appears likely that many would have produced different strategies to those now being considered and implemented, perhaps more along the lines of those proposed by the South and West Yorkshire and ORBIT studies.

6. INTEGRATED SOLUTIONS

The studies examined, designed and tested the introduction of a number of different packages of transport measures to meet the study objectives. It would therefore be expected, if the multi-modal approach is to have added value to the process of transport planning, that there would also be some connectivity between schemes in the implementation phase. That is to say, where road and public transport solutions or road improvement and restraint measures are proposed, both proceed. Indeed, a number of the studies pointed out the need for balanced implementation if the full benefits of the package were to be seen. The south-east Manchester study stated that 'it is not possible to pick and choose elements of the strategy because they are apparently popular or easy or quick or cheap to implement. The full benefits from the strategy will only be seen when it is implemented as a whole. If this should be proved not possible, the entire strategy should be reviewed.'⁸

The West Midlands area study analysed the implications of failing to implement each of the three major elements of its strategy: infrastructure schemes, road charging and behavioural change. The results of the analysis are presented in Fig. 7. Only with all three elements of the strategy in place was

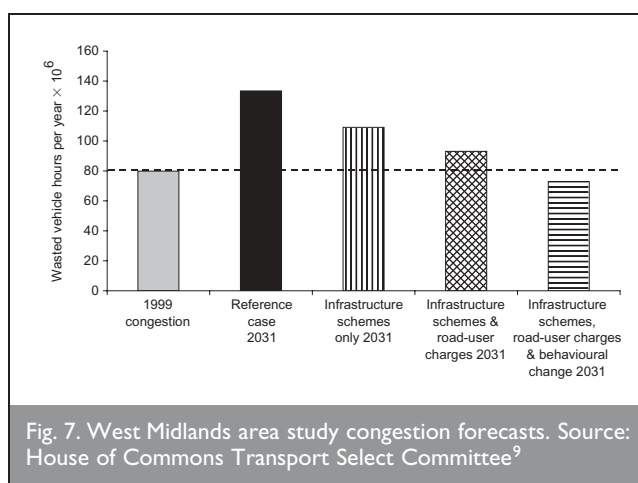


Fig. 7. West Midlands area study congestion forecasts. Source: House of Commons Transport Select Committee⁹

the total number of hours lost due to congestion reduced from current levels by 2031.

While most of the studies highlighted the importance of the integrated nature of the strategies, the M1 in the East Midlands study pointed out the dominance of the road widening in its strategy: 'Whilst a detailed analysis of individual schemes has not been completed, on the basis of previous detailed analysis, the omission of no other single element (apart from the road expansion) will render the strategy ineffective in terms of the Government's national transport objectives.'¹⁹

7. CHANGES TO THE ROAD-BUILDING PROGRAMME

The multi-modal studies have had a significant impact on the road schemes referred to the studies following the 1998 roads review. The majority of road schemes referred to the studies were put forward to the Secretary of State for approval. As the data in Table 3 show, the estimated cost of the proposals totals around £10.5 billion (£7 billion less than the spending proposed for public transport), significantly higher than the value of the roads programme the Government inherited. However, the multi-modal and broad policy approach has meant that many of the schemes are different in nature to those considered pre-1998. Examples include on-line alignment expansions (e.g. A14 in CHUMMS) and reduced-scale bypasses (e.g. A555/523 Poynton Bypass in SEMMMS).

Much of the change in scope was as a result of other measures working in tandem such as improved public transport and demand management initiatives. The Secretary of State however did not approve all of the recommendations submitted to him. A number of roads passing through environmentally sensitive areas, proposed by the studies and the regional planning bodies, were rejected on these grounds (e.g. Hastings Eastern and Western Bypasses, Stourbridge and Wolverhampton Bypass and three bypasses and two tunnel schemes proposed on the A27). A summary of the schemes remitted, the proposals put forward by the regional planning bodies and the decisions announced by the Department for Transport are shown in Table 2 for eight studies. It is interesting to compare the different priorities assigned to environmental impacts by the regional planning bodies and central government. Were more decision-making powers to be devolved to the regions, it may well be that different packages of schemes would be approved.

The findings of the studies have also had significant influence on the Government's attitude to the need for measures to both restrain and manage demand. It announced that, in parallel with the July 2003 announcement on the results of 11 of the studies, it would carry out a feasibility study into a possible national road-user charging scheme.²⁰ It has accepted that while expanding the inter-urban network will provide short-term relief it is not the 'long-term answer to inter-urban congestion' and that building on such a scale would be 'very expensive, environmentally damaging and in any event, difficult to deliver'.²⁰ The letters to regional planning bodies that accompanied the July 2003 decisions noted that 'our decisions to increase capacity on the strategic network are taken parallel with a commitment to ensure that effective measures are in place to lock in the benefits'.²¹

8. CONCLUSIONS

At a combined cost of over £32 million, the multi-modal studies represent the largest ever attempt to understand and design solutions to transport problems in the UK. Significant levels of data collection, modelling and public consultation have led to a detailed understanding of the nature of many of our worst transport problems.

Modelling suggests that, in the absence of any demand restraint, traffic volumes could grow on average by 1.5% per year through to 2030. This would mean 687 billion vehicle kilometres travelled per year, compared to the 2001 figure of 473.7. It is perhaps therefore unsurprising that few of the studies were able to find a long-term solution to reduce or even hold congestion constant. Those studies that were able to offer such outcomes proposed an integrated strategy of capacity enhancement and demand management and traffic restraint measures. Public transport improvements were also an important feature of many studies, particularly those based around major conurbations.

The Department for Transport has made a major step forward in accepting the long-term need for measures to ensure that the benefits gained from the capacity approved now are not simply swallowed up by the forecast growth in traffic. Such a stance by no means guarantees the introduction of area-wide road-user charging or some other fundamental change to the way

we pay for travel. However, the large range of options and alternative strategies tested by the studies provide strong evidence to suggest that there are no other easier solutions capable of achieving the Government's objectives in the long term. It has recently been argued by some political parties, motoring organisations and industry bodies that more capacity could be provided than has been approved as a result of the studies. However, the findings from the studies allow the following three conclusions to be drawn about such an approach.

- (a) The schemes that have been rejected have, for the most part, been refused on the grounds of potential serious environmental impacts to areas of outstanding natural beauty or sites of special scientific interest. No overwhelming justification for these schemes has been demonstrated to override the Government's presumption against new roads in such circumstances. Reconsideration of such decisions would require a very significant about-turn in the importance that was attached to such areas in future decisions.
- (b) There is evidence to suggest that the expansion programmes put forward, particularly those without road-user charging, are already likely to lead to increases in carbon dioxide emissions from current levels (despite the very significant technological improvements in vehicles expected over the next decade). This is working against the Government's general commitments to reduce carbon dioxide emissions. Any further expansion would be likely to generate some extra traffic and exacerbate this problem.
- (c) The studies have concentrated, for the most part, on inter-urban travel patterns with less attention given to travel in city areas. Any further traffic generated from even greater expansion would put more stress on urban networks which are likely to be at trip ends. There is little or no scope to expand these networks to cope with this growth.

Despite the disappointment that has been voiced about the lack of funding for rail and some of the other public transport proposals put forward, the multi-modal studies have undoubtedly brought about a more balanced and integrated approach to transport planning. There have been quite significant changes to the roads schemes that were initially remitted to the studies and evidence to suggest that significant environmental concerns are now playing a much stronger role in decisions taken by the Department for Transport. This process also highlighted some interesting tensions between the infrastructure desires of the regions and the funding and environmental responsibilities of central government.

The emphasis now switches to the challenges to the construction and transport industries and transport planners to deliver the proposals put forward. Not only does the infrastructure programme represent a very significant programme of work, but it also raises other technical, operational and planning challenges. Further work is required for example, to understand how traffic operations will work on five- and six-lane stretches of motorway, whether hard-shoulder running will prove safe and the extent to which capacity can be expanded through the application of intelligent transport systems to provide information and manage flows. Most studies also proposed that significant reductions in traffic

could be achieved through information and the application of demand management measures. However, some such initiatives are still in their infancy and will require significant funding and political support to achieve the large-scale impacts expected. Whilst the studies have proposed solutions to the most pressing travel problems in England, much remains to be done to see the visions turned into reality. As many of the studies point out, their solutions require integrated action from many agencies. The challenge now is therefore to ensure that this happens. Failure to do so will substantially reduce the benefits that the strategies produce.

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REFERENCES

1. DEPARTMENT OF TRANSPORT. *Roads for Prosperity*. Her Majesty's Stationery Office, London, 1989, Cm 693.
2. STANDING ADVISORY COMMITTEE ON TRUNK ROAD ASSESSMENT. *Trunk Roads and the Generation of Traffic*. HMSO, London, 1994.
3. ROSEN P. Pro-car or anti-car? 'Environment', 'economy' and 'liberty' in UK transport debates. In *Transport Lessons from the Fuel Tax Protests of 2000*. Ashgate, London, 2002, pp. 27–46.
4. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *A New Deal for Transport: Better for Everyone*. The Stationery Office, London, 1998.
5. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *A New Deal for Trunk Roads in England*. Her Majesty's Stationery Office, London, 1998.
6. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *Guidance on the New Approach to Appraisal*. DETR, London, 1998.
7. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *Guidance on the Methodology for Multi-Modal Studies Volumes 1 and 2*. DETR, London, 2000.
8. STEER DAVIES GLEAVE, LLEWELYN-DAVIES and WS ATKINS. *South East Manchester Multi Modal Study, Final Report*. Government Office for North West Manchester, September 2001.
9. TRANSPORT SELECT COMMITTEE. *Jam Tomorrow?: The Multi-Modal Study Investment Plans*. Third Report of the House of Commons Transport Committee (HC 38-I). The Stationery Office, London, 2003.
10. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *Transport 2010: The 10 Year Plan for Transport*. Her Majesty's Stationery Office, London, 2000.
11. STRATEGIC RAIL AUTHORITY. *The Strategic Plan 2003: Platform for Progress*. SRA, London, 2003.
12. MCNULTY T. Letter to the West Midlands Regional Assembly. London, 9 July 2003. Available at [www.gowm.gov.uk/MultiModal/stories/storyReader\\$56](http://www.gowm.gov.uk/MultiModal/stories/storyReader$56) (accessed 10 March 2005).
13. TRANSPORT SELECT COMMITTEE. *Jam Tomorrow?: The Multi-Modal Study Investment Plans*. Evidence to the Third Report of the House of Commons Transport Committee (HC 38-II). The Stationery Office, London, 2003.
14. BYERS S. Letter from Secretary of State to multi-modal study teams. London, 2002.
15. GOVERNMENT OFFICE FOR YORKSHIRE AND THE HUMBER. *South and West Yorkshire Multi-Modal Study Summary Report*. Leeds, 2002.
16. HALCROW. *Soft Factors Report*. Halcrow, London, 2002, Report for Department for Transport. Available at: <http://www.roads.dft.gov/roadnetwork/heta/sfreport/01.htm>.
17. DEPARTMENT OF ENVIRONMENT, TRANSPORT AND THE REGIONS. *Transport Economics Note*. DETR, London, 2001.
18. DEPARTMENT FOR TRANSPORT. *Transport 10 Year Plan 2000: Delivering Better Transport—Progress Report*. Her Majesty's Stationery Office, London, 2002.
19. WS ATKINS. *North South Movements on the M1 Corridor in the East Midlands Final Report*. Government Office for East Midlands, Nottingham, 2002.
20. DEPARTMENT FOR TRANSPORT. *Managing Our Roads*. DfT, London, 2003.
21. MCNULTY T. Letter to Councillor Nick Skellet, chair of South East Regional Assembly from the Parliamentary Under-secretary of State for Transport. London, 9 July 2003.

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