National Audit Office

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Highways Agency

Procurement of the M25 private finance contract

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National Audit Office

Highways Agency

Procurement of the M25 private finance contract

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Amyas Morse
Comptroller and
Auditor General

National Audit Office

17 November 2010

This report focuses on the Agency's decision-making, to assess whether it has procured a value for money solution to congestion and poor journey time reliability on the M25.

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This report can be found on the National Audit Office website at www.nao.org.uk/M25-2010

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Summary

Introduction

1 The Highways Agency (the Agency), established in 1994, is an executive agency of the Department for Transport (the Department). The Agency is responsible for operating, maintaining and improving England's network of motorways and all-purpose trunk roads. Its objectives include managing traffic, tackling congestion, providing information to road users, and improving safety and journey time reliability.

2 The M25, completed in 1986, forms a 125-mile orbital route some 20 miles from the centre of London. The Dartford Crossing, two tunnels and a bridge crossing the Thames at Dartford, completes the loop. The M25 is the major route around London, carrying international traffic between entry points and the rest of Britain. It also forms the hub of the English motorway system, and serves as a commuter route for local traffic.

3 The Agency needed a solution to high levels of congestion and poor journey time reliability on the M25. In May 2009, the Agency signed a 30-year private finance contract with Connect Plus. The contract requires Connect Plus to widen two sections of the M25 (around 40 miles), and to refurbish the Hatfield Tunnel. Connect Plus must also operate and maintain the M25, including the Dartford Crossing, plus 125 miles of connecting roads at junctions. It is also required to design a solution for congestion for two further sections of the M25 (around 25 miles). The contract has a present value cost of £3.4 billion. Of this total, the widening of the initial sections has a present value construction cost of £900 million and delivers £2.3 billion present value benefits. **Figure 1** shows the organisations involved in the contract.

Scope of the report

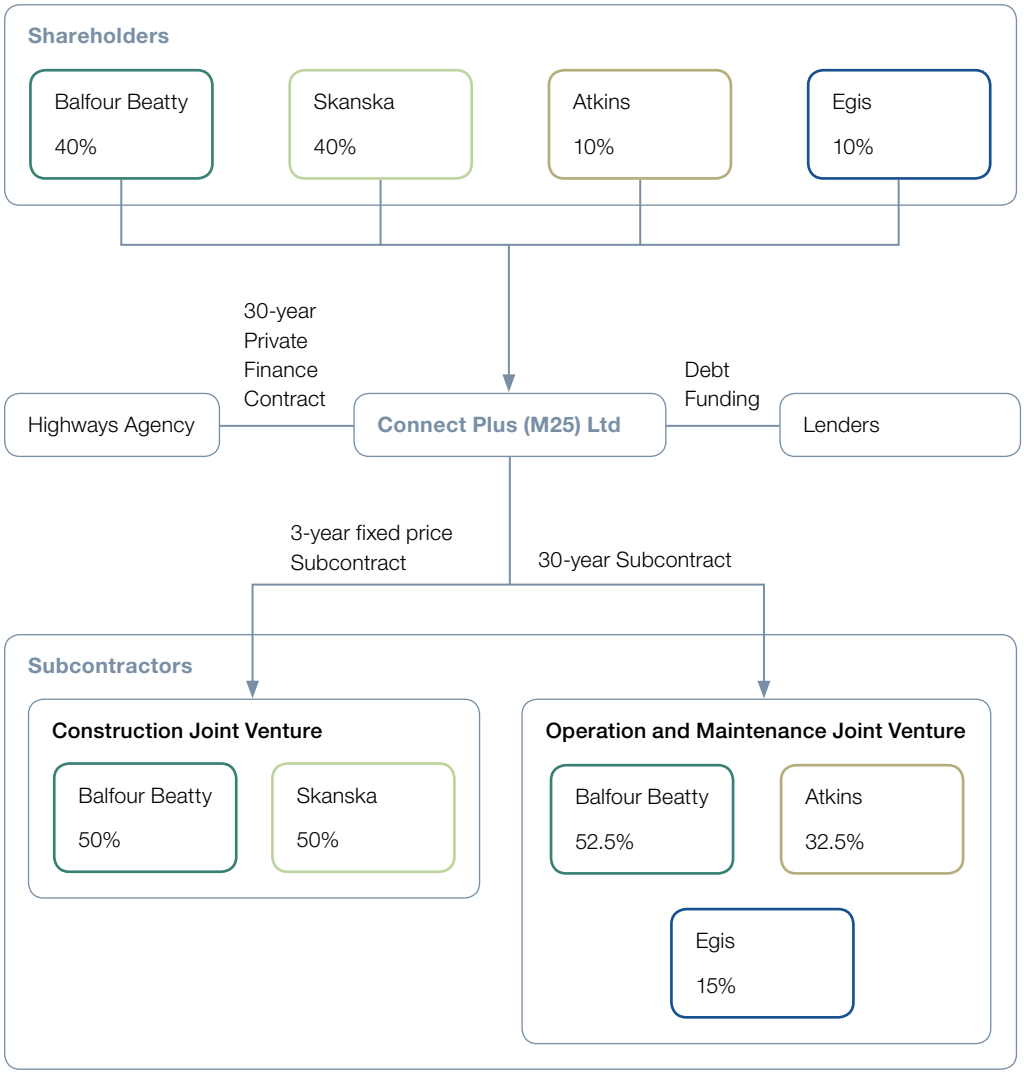
4 This report focuses on the Agency's decision-making, to assess whether it has procured a value for money solution to congestion and poor journey time reliability on the M25. It had a number of key decisions to make including whether to:

- deal with congestion through road widening or hard shoulder running;
- use private finance or conventional procurement; and
- let the contract during the credit crisis.

We have considered both:

- the decisions which the Agency took based on the evidence it had available at the time it made those decisions (Appendix 1); and
- whether the Agency had the right information to make optimum use of taxpayer resources.

Figure 1
Organisations involved in the M25 contract



Source: National Audit Office analysis of Highways Agency data

5 We used the following value for money criteria:

- Did the Agency consider all options and select a value for money solution in deciding to widen the road using a private finance contract? (Part One)
- Did the Agency manage the procurement of the widening deal effectively? (Part Two)
- Did the Agency give appropriate consideration to alternative solutions? (Part Three)

6 Our study methodology can be found in Appendix 2.

Key findings

Decisions leading to the procurement of the contract

7 The Agency's decision to widen the M25 has the potential to deliver benefits. The M25 sufferes from high levels of congestion and poor journey time reliability, and the Agency's objectives include improving these. It intends the widening to increase average speeds in the opening year by 10 miles per hour, and reduce the accident rate by 1.5 per cent. These benefits are assessed as approximately £2.3 billion.

8 In 2003, the Agency and the Department decided to widen the M25 rather than adopting a flexible procurement strategy which could also accommodate other solutions. The Agency wanted a clear solution to address congestion on the M25. At that time it had insufficient evidence of the effectiveness of alternatives to widening, such as hard shoulder running. Hard shoulder running allows drivers to use the hard shoulder at times of peak congestion, providing additional capacity, although this is likely to be less than that provided by widening as speed limits are needed to ensure safety. This technique, which was first trialled in Europe in 1996, is cheaper as it requires less construction; it also delivers fewer benefits. The Agency had announced its intention to trial this technique in 2001 and, in 2003, let a contract for the development of a trial section on the M42. A procurement strategy for the M25 project that kept both widening and hard shoulder running as serious options would have given more scope for a full assessment of both solutions before a contractual commitment.

9 We reported in 2004 that the Agency had been slow and too risk-averse in testing new congestion measures. We recommended that the Agency should carry out more trials at more sites to increase its chance of success with new methods.[1] The Agency continued its trial of hard shoulder running but, as it did not have the trial results, it decided in 2005 to specify a road widening solution when it advertised the procurement competition for the M25 contract.

Management of the procurement: the widening project

10 The Agency ran a generally effective and competitive procurement for the widening deal it advertised in 2005. The project was attractive to the market due to its size and the opportunity to operate a major road system for 30 years. The Agency consulted with industry, responded to feedback and learned lessons from earlier procurements.

1 *Tackling congestion by making better use of England's motorways and trunk roads*, HC 15, November 2004.

11 There was, however, some slippage in the timetable. The Government announced its intention to proceed with the widening of five sections of the M25 in July 2003 and asked the Agency to carry out further development work. The schemes entered the targetted programme of improvements in April 2004. The Agency's initial 2004 timetable anticipated construction of the first section starting in May 2007 which we consider was a reasonable timetable. When the Agency drew up its 2004 timetable it had not decided on the procurement strategy. During industry consultation in May 2005, following its decision to widen four of the sections using private finance, the Agency revised the date when it would the award the contract and construction would start to May 2008. The Agency said that this start date reflected a reasonable programme for the procurement. The contract was not, however, let until May 2009. The delays in both preparing and executing the procurement before the credit crisis added around 18 months to the Agency's initial 2004 timetable.

12 Exposing the project to risk for longer than was expected resulted in the Agency encountering the credit crisis which added £660 million to the price. The credit crisis in 2008, which the Agency could not have foreseen, made raising finance difficult. When it arose, the Agency worked hard to obtain financing for this project. This helped to deliver market confidence for completing the private financing of subsequent projects across government. As we have recently reported[2], these projects bore much higher financing costs than before the credit crisis. The delays, which we consider could have been avoided, exposed the project to risk for longer than anticipated. As a result, the present value cost increased from £2.7 billion in May 2008 to £3.4 billion by contract award in May 2009, mainly due to the higher financing costs banks required during the credit crisis. We estimate that the Agency may recover around £100 million if the project is refinanced, but there is no certainty this will occur. The Agency hopes to achieve a higher level of gains through refinancing.

13 The Agency used a benchmark cost model but did not intend this to be an estimate of the cost of a privately financed solution. In January 2008, the Agency assessed quality compliant bids against a benchmark cost model. The Agency's cost model was up to 27 to 43 per cent higher than the bids. The main difference was that operational and maintenance costs in bids from the two remaining bidders were substantially lower than the Agency's lowest estimate. While the Agency satisfied itself that the bids were robust and in line with market rates, it did not, however, produce an analysis of the reasons for the differences between the bids and its cost model. In our experience, an accurate 'should-cost' model for private finance projects can help in planning financial resources and bid negotiations. It can also identify ways in which comparison with a conventional procurement can be improved.

2 *Financing PFI projects in the credit crisis and the Treasury's response*, HC 287, July 2010.

14 The savings between the privately financed widening deal and the same project conventionally procured are not as clear cut as the Agency calculated. Before closing the deal, the Agency compared the present value cost of the contract (£3.4 billion) against its updated estimate for procuring the widening conventionally through multiple contracts (£3.4 billion-£4.2 billion). The comparator was updated from the Agency's 2004 estimate, which was £3.6 billion in equivalent prices, drawing on information in its benchmark cost model. We are concerned about the credibility of the comparison because the Agency had not taken up the earlier opportunity to investigate the difference between the bids and its benchmark cost model. Consequently, the updated comparator, in our opinion, was not a sufficiently robust guide to likely costs under a conventional procurement.

Management of the procurement: consideration of alternative solutions

15 The Agency, taking account of the initial result of trials for hard shoulder running and acting on legal advice, did not pursue potentially cheaper variant bids for this technique. Private finance projects usually define the outputs required allowing flexibility over the solution. The Agency, in its 2005 procurement advertisement, had specified only widening. It considered it was unable to ask for bids on hard shoulder running until it had obtained robust trial data and identified appropriate operating and engineering standards. In 2007, one of the bidders wanted to submit a hard shoulder running option. The Agency was initially interested in exploring this option with all bidders, but decided not to. Its decision was based on: legal advice that such a change risked exposing the Agency to legal challenge; and results from the initial trials of hard shoulder running on the M42 which the Agency considered did not give compelling evidence for using hard shoulder running.

16 The initial trials indicated that there would be a loss of benefits from hard shoulder running, compared to widening, although there was variation in these results. Using the technique at 60 miles per hour would secure 80 per cent of the benefits of widening, but at 50 miles per hour only 35 per cent. The Agency did not have a detailed assessment of the benefits that would arise when using the technique on the M25 sections that it was widening. It doubted, however, the technical suitability of hard shoulder running for one of the two sections which had high traffic flows. The Agency reached a similar conclusion in 2008 when the new Secretary of State requested reassurance from the Agency that motorway widening remained the best solution. This assessment also took into account calculations (which we consider cautious) that this new approach would not deliver cost benefits and concern about the adverse consequences of aborting the procurement.

17 In July 2008, seven years after it had announced its intention to trial hard shoulder running, the Agency was finally satisfied with the general benefits and savings potential of this approach which it is now putting into use. In 2009, shortly before letting the widening contract, a programme of hard shoulder running became part of the Department's policy for managing motorways and major trunk roads. The value of this work under way or planned on ten major roads is £3.7 billion. Although the

Agency kept under review the possibility of using the approach for the two sections of the M25 targeted for widening, the Agency continued to doubt that the approach was technically suitable for one of these sections. The Agency now plans to use the approach to relieve congestion and improve journey time reliability on two other sections of the M25.

18 We consider that, through a faster assessment of the costs and benefits of hard shoulder running and a more flexible procurement approach, the Agency could have adapted its project to give serious consideration to the technique. The Agency was never in a position to consider seriously hard shoulder running as an alternative to its planned widening of the M25. To have seriously considered hard shoulder running during the procurement, the Agency would have needed to: complete earlier its general assessment of hard shoulder running; consider the cost and benefits of using it on the M25; and keep its options open longer. Even in late 2008 and early 2009, when the Agency had satisfied itself on the general benefits and savings of hard shoulder running, we believe it should have given greater consideration to hard shoulder running in its final decision to let the widening contract.

19 The Agency did not thoroughly assess the savings that an acceptable conventionally procured hard shoulder running solution could provide, savings we estimate as potentially ranging from £400 million to £1.1 billion. This range of possible savings compared to the privately financed widening of the M25 represents 12-32 per cent of the widening contract price. Savings would have been available through lower construction and financing costs. The top end of our savings scale is reached if the Agency's lowest estimate of conventionally procured operation and maintenance costs is reduced by £400 million to match the costs expected by Connect Plus (Appendix 3). The Agency considers that these efficiencies in operation and maintenance costs could not have been achieved through short term conventional contracts.

Management of advisers

20 We consider that the Agency was overly reliant on its advisers. The Agency spent £80 million (7.5 per cent of the capital value) on advice and support from external organisations, including £45 million on technical advice of which £24 million related to design works. The Agency has not reviewed the total costs of its procurement to identify lessons for future projects. The Agency continues to rely on advisers for contract management support and documentation about the procurement. The Agency's reliance on advisers has built up over time and in part reflects insufficient commercial and technical skills within the Agency. The Agency risks advisers controlling projects and having little incentive to transfer knowledge back to the Agency. The Agency is now addressing these issues.

Securing the benefits of the widening

21 Maintaining the long-term benefits of the project depends on completion of separate demand management techniques which have taken a long time to develop. Previous experience shows that new road capacity rapidly fills, reducing the benefits of making more road available. When the Agency committed to widening the road it was approved on the understanding that measures to manage demand would be developed in parallel. However, in 2010 the Agency is still testing the viability of the demand management measures it started considering in 2003. It does not expect results until May 2012, just before the planned completion of the first sections of widening. The Agency sees the demand management project as delivering additional benefits in reducing M25 congestion at additional costs. We believe, however, there are risks to maintaining the long-term benefits of the widening project and its potential value without the early implementation of demand management.

Value for money conclusion

22 The Agency's aim was to relieve congestion and improve reliability through securing a private sector partner to widen the M25. It ran a generally effective and competitive procurement in pursuit of that aim and worked with Connect Plus to obtain financing at market rates during the difficult financing conditions in early 2009. Throughout, the Agency assessed the value for money of the project based on the available information relevant to its specified objective of widening the M25. We note, however, that delays in preparing and finalising the project exposed the project to risk for 18 months longer than expected with the result that it incurred higher financing costs in the credit crisis. This increased the net present cost of the deal by £660 million (24 per cent) to £3.4 billion.

23 In considering the Agency's approach, we looked at whether the Agency could reasonably have been expected to achieve a better outcome, in terms of the use of public funds, to secure increased capacity on the M25 at times of peak congestion. We believe that the Agency could have achieved a materially better value for money outcome by a more agile approach to procurement, recognising the potential cost saving implications of hard shoulder running and keeping the contracting approach open to allow its use. In addition, by driving the whole procurement process forward more promptly, we consider the Agency could, and would, have avoided the cost effects of the financial crisis.

24 The Department acknowledges that the procurement process did extend beyond its 2008 target for signature, which reflected time spent on finalising complex tender documents, on a limited rebid, and on the finance competition during the credit crisis. However, the Department does not accept that hard shoulder running is simply a lower cost solution, but is one that offers materially lower benefits for the reduced cost. Ministers deliberately chose to provide higher benefits and pay the higher costs given the M25's strategic importance.

Recommendations

The Agency and Department

a **The Agency's estimate of expected costs was 27-43 per cent higher than the bids it subsequently received.** The Agency should investigate why its estimates were much higher than the bids, and identify lessons to improve future estimates. In future projects the Agency needs to use its recently improved processes to ensure it is putting together robust estimates of costs. This is particularly important where the Agency relies on them to demonstrate value for money and to plan how much money is available for other projects.

b **The Agency continues to rely heavily on advisers at considerable cost.** Within current budgets, the Agency needs to build its in-house commercial and technical capability for considering alternative technical solutions, procurements and contract management, and reduce its reliance on advisers. It must ensure it has good internal knowledge of projects.

c **The Department is testing demand management techniques to maintain the benefits of the widening over the longer term, but does not expect results until 2012.** The Department must ensure that it has a robust benefits realisation plan for the widening, with appropriate measures to obtain maximum benefit. The Department and the Agency should develop a strategy, by 30 June 2011, for managing the risks to introducing demand management.

To all departments

d **The Agency did not allow itself the flexibility to explore alternative solutions to achieve its aims.** Departments need to explore all reasonable options thoroughly, and include a full evaluation of the benefits and disadvantages of credible options. Large or complex procurements may take a number of years to complete. Departments should, therefore, allow themselves flexibility when advertising procurements to consider emerging technologies which may prove to be value for money, taking account of both costs and benefits.

e **By exposing the project to risk for longer than had been expected the Agency incurred higher financing costs in the credit crisis.** Departments should endeavour to remain on timetable to take advantage of good market conditions as these are not guaranteed to continue. Where market conditions have deteriorated, or are expected to, departments should assess the benefits and disadvantages of continuing, deferring or abandoning the procurement.

Part One

Decisions leading to procuring the contract

Decision to widen the M25

Reason for action

1.1 The M25 suffers high levels of congestion and unpredictable journey times. Soon after opening, traffic levels exceeded the M25's capacity of 88,000 vehicles a day, with traffic growing at about two per cent a year. In the 1990s the Government widened the motorway between junctions 7 and 16, but high levels of congestion persist. In 2009, the average flow on the M25 East was 121,000 vehicles per day, with 147,000 on the M25 West.

1.2 Congestion on the M25 is due to the lack of an alternative orbital route or a public transport orbital route; developments around the M25 generating large volumes of traffic; and cultural changes increasing car use. In the year ending March 2010, 18 per cent of total vehicle delay in England was experienced on the M25.

Assessment of possible solutions

1.3 In 2000, the Government commissioned a consortium of consultants led by Kellogg, Brown and Root to examine existing and future problems and produce a long-term sustainable strategy for the M25. Their objectives included developing a strategy that made the best use of the existing network to reduce congestion and improve journey time reliability, and that reduced growth in traffic demand on the orbital network.

1.4 The consultants assessed various strategies, including:

- best practice traffic management, for example, during roadworks and incidents;
- alternatives to car travel, principally by improving public transport;
- ways to reduce traffic levels, including employer travel plans or user charging; and
- increasing the capacity of the M25.

1.5 The consultants reported in 2002.[3] Their preferred strategy was widening most of the remaining three-lane sections to four lanes, combined with area-wide user charging. They concluded that area-wide user charging (charging most users on most roads in the study area) would be the most effective method of reducing both the volume and length of commuting trips by car on the M25. The Department subsequently published a study on the feasibility of road charging[4], concluding that a national area-wide system would not be technologically feasible before 2014.

1.6 In the absence of user charging, the consultants recommended widening if combined with measures to reduce and control demand.

1.7 In 2003, the Department responded to the consultants' report. The Department supported widening five sections of the M25 together with developing proposals for demand management and improved management of the motorway. The Secretary of State approved these proposals in July 2003, and in April 2004 the five widening schemes entered the Agency's strategic plan for improving the network (**Figure 2** overleaf). The Agency considered demand management as a separate project.

Widening versus alternative solutions

1.8 As an alternative to widening, the consultants considered Active Traffic Management, the use of traffic management measures, such as allowing drivers to use the hard shoulder at times of peak congestion.

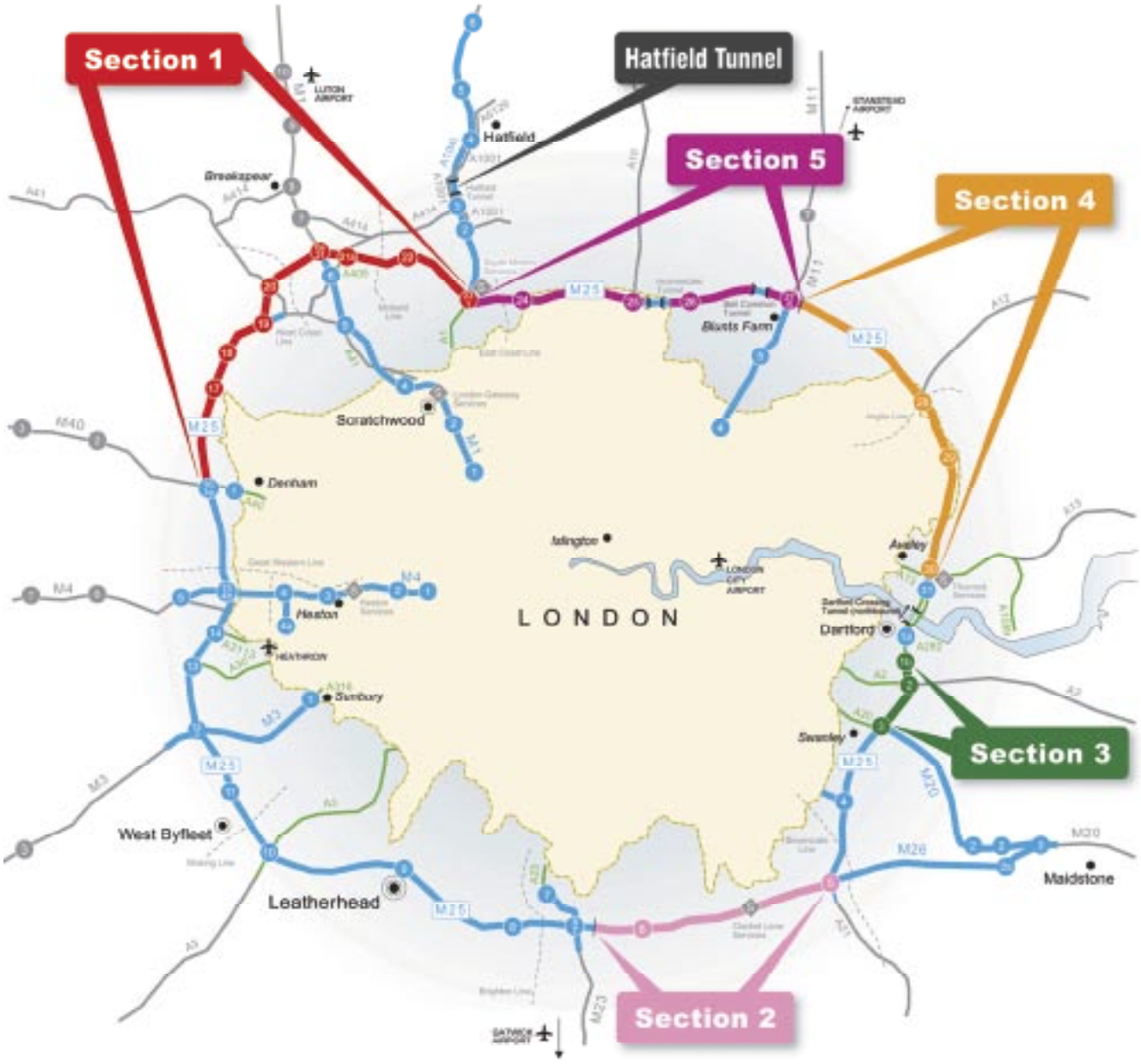
1.9 In 2001, the Department had announced an Active Traffic Management trial centred around the use of hard shoulder running on a 10-mile stretch of the M42. The Agency based the trial on experience from the Netherlands, which, like Germany, had started trialling hard shoulder running in 1996. The consultants concluded that the Active Traffic Management could be applied to the M25 at a later date subject to the success of the M42 trial.

1.10 The Agency had assessed the M25 as a possible location for the Active Traffic Management trial in 2000 but rejected it in favour of the M42 which had a better cost benefit ratio. The Agency did not further assess Active Traffic Management before accepting the recommendation to widen the M25, considering the technology was unproven in the UK.

1.11 In 2004, when the Department for Transport commissioned the widening of the M25, the Agency, which had previously focused on building and maintaining roads, was still adapting to a new role of network operator. This new role included wider objectives to reduce congestion. Between 2001 and 2004, 76-82 per cent of the Agency's spending on tackling congestion had been on constructing new roads.

3 *Orbit: transport solutions around London*, November 2002.
4 *Road Pricing Feasibility Study*, 2004.

Figure 2
Scope of the M25 widening



Source: Highways Agency

1.12 We reported in 2004 that the Agency was behind some overseas countries in adopting technologies to tackle traffic congestion and was too risk-averse in testing measures such as hard shoulder running. We recommended that the Agency should adopt a more expansive approach to testing new methods, carrying out more trials at more sites whilst managing the risks involved.[5]

1.13 The Agency has now changed its focus and is actively considering alternatives to widening. Nevertheless, by focusing on widening the M25 at the outset rather than adopting a strategy which allowed greater consideration of alternative solutions. We believe the Agency limited its ability to achieve better value for money.

Decision to use private finance

Preference for private finance

1.14 In November 2004, the Agency assessed options to procure the widening of Sections One, Two, Four and Five of the M25 (it linked Section Three to improvements on the A2, progressing this work separately). The Agency assessed three options:

- multiple conventional contracts;
- multiple private finance contracts; and
- a single private finance contract.

1.15 The Agency's preference was for a single private finance contract. It did not assess a single conventional contract, considering, based on experience, that industry would be unwilling at that time to take on conventional contracts worth more than £250-£350 million. The capital cost of the M25 project was over £1 billion.

1.16 The Agency had experience of private finance, awarding its first four contracts (known as Design, Build, Finance, and Operate contracts) in 1996.[6] By 2004 it had let 11 such contracts, covering nearly 10 per cent of its 4,500-mile road network.

1.17 The Agency had a target to use private finance for 25 per cent of its road programme. It identified that projects likely to deliver savings were ones that include a large element of capital expenditure, spread over an extended period, and in which the relatively high costs of tendering are proportional to the value of the contract. The M25 project met these criteria.

5 *Tackling congestion by making better use of England's motorways and trunk roads*, HC 15, November 2004.
6 We reported on these schemes in *Department of the Environment, Transport and the Regions: The Private Finance Initiative: The First Four Design, Build, Finance and Operate Roads Contracts*, HC 476, January 1998.

1.18 The Agency considered that a single private finance contract would be advantageous for the construction and the operation of the M25 because:

- Construction – contractors could achieve efficiency by using the same arrangements, such as appointing subcontractors for all sections; and learn lessons for later sections. A single private finance contract could also reduce the risk of delays on earlier contracts causing delays on later contracts, known as interface risk.
- Operation – a single company responsible for the M25 would have easier interactions with third parties such as the emergency services, and the opportunity to make operating efficiencies.

Cost comparisons

1.19 The Agency estimated that a single private finance contract would be 7-15 per cent better value for money than a conventionally procured solution (**Figure 3**). This was supported by a qualitative assessment of the benefits. There were limitations in this assessment:

- Constructions costs (**Figure 4**) were based on data from 1992-94 as subsequent private finance contracts were not considered suitable as they were different in nature.
- The Agency did not use a range of outcomes for conventional procurement construction which we consider would have helped the comparison.
- The Agency based its calculations for conventional procurement on its old 1990s contracts which were competitively procured but subject to significant overruns. The Agency subsequently benchmarked its conventional procurement estimate against the total cost of road widening works in its new contract for the M1 Junctions 6A to 10. We have some reservations about the robustness of this comparison because of the overruns in the 1990s contracts and the fact that construction cost rates within the M1 costs were lower than those in the Agency's calculations.
- The Agency assumed that the operation and maintenance costs, which account for around 65 per cent of the costs, would be the same as it had previously incurred. This did not consider the scope for further efficiencies in either the privately financed or conventional options. The Agency doubted that it could achieve efficiencies in conventional procurement.

1.20 As with any cost estimate the results are sensitive to changes in assumptions. For example, reducing the percentage added to the conventional option for additional risk from 35 to 25 per cent would reduce the construction cost by £85 million.

Figure 3

The Agency's assessment of the costs of different procurement options

		Present value of costs (£m)[1]	The Agency's expected value for money against conventional procurement (%)
Multiple conventional		2,671	–
Single private finance	Optimistic, full benefits[2]	2,271	15
	Optimistic, reduced benefits[2]	2,328	13
Single private finance	Pessimistic, full benefits[2]	2,433	9
	Pessimistic, reduced benefits[2]	2,489	7

NOTES

1 2001 prices.

2 'Full benefits' reflects the expectation that under a single private finance option the widening could be completed at least a year earlier. 'Reduced benefits' excludes this benefit.

Source: National Audit Office analysis of Highways Agency data

Figure 4

The Agency's calculation of the construction costs of a multiple conventional contract compared to multiple and single private finance contracts

Type of contract		Base cost excluding risk managed by the contractor (£m)	Cost of risk managed by the contractor (£m)	Total base cost (£m)	Percentage added for additional risk[4] (%)	Cost of additional risk (£m)	Total construction costs (£m)
Multiple conventional		792	64	856	35	300	1,156
Multiple private finance	Optimistic[2]	792	45	837	31	261	1,098
	Pessimistic[3]	792	58	850	38	320	1,170
Single private finance	Optimistic	792	45	837	17	139	976 (£180m cheaper than conventional)
	Pessimistic	792	58	850	32	275	1,125 (£31m cheaper than conventional)

NOTES

1 All costs are in 2001 prices.

2 In the optimistic scenario, the Agency assumes that the contractor will be able to manage risks under its control 30 per cent better than under conventional procurement, and assumes no cost arising from interface risk.

3 In the pessimistic scenario, the Agency assumes that the contractor will be able to manage risks under its control 10 per cent better than under conventional procurement, and assumes some cost (lower than in conventional procurement) arising from interface risk.

4 This takes into account optimism bias, including the cost of risks such as changes made by the Agency, bad weather, and interface risk.

Source: National Audit Office Analysis of Highways Agency Data

Part Two

Management of the procurement: the widening project

Selection of Preferred Bidder

The contract

2.1 The Agency's objectives for the M25 widening included delivering a high quality service putting road users first, while reducing congestion and improving journey time reliability and safety. It sought a private finance contract to:

- widen four sections of the M25 (around 60 miles);[7] and
- operate and maintain the 125 miles of M25 including the Dartford Crossing, plus 125 miles of connecting roads at junctions.

2.2 The Agency identified industry concerns about the risks of pricing later sections as it planned to spread the widening over around seven years. It therefore aimed to procure a fixed price for the first two sections (Sections One and Four) and to agree the price of the later sections subsequently, based on costs experienced on the first two. The Agency included Section Four, which had the least favourable cost benefit ratio, in the widening project for project management reasons (**Figure 5**).

Figure 5
Economic appraisal of the benefits and costs of widening

	Present value of benefits[1] (£m)	Present value of costs[1,2] (£m)	Benefit to cost ratio
Section 1 (initial section)	1,368	264	5.15
Section 2 (later section)	458	84	5.43
Section 4 (initial section)	687	337	2.04
Section 5 (later section)	931	249	3.74

NOTES
1 2002 prices.
2 Present value of costs includes discounted scheme costs and discounted indirect tax revenues.
3 In 2007 prices, the estimated present value of the benefits of the two initial sections is £2.3 billion.

Source: Highways Agency

7 Section Three was dealt with under a separate contract.

2.3 The Agency incorporated lessons learnt on previous private finance contracts. In particular:

- The M25 payment mechanism has lane availability as the key measure rather than usage and demand.
- The Agency redesigned the change mechanism. It can make minor changes up to a certain limit with no change to the monthly charge. There is also a contract review clause, as an alternative to termination, allowing the Agency to renegotiate the contract if it radically changes its requirements.

2.4 The project was attractive to the market due to its size and the opportunity to operate a major road system for 30 years, and the Agency ran a competitive procurement process. The Agency prequalified five potential bidders, and then reduced these to three consortia in October 2006:

- ALF – Amey, Laing O'Rourke and Ferrovial Agroman;
- Connect Plus – Balfour Beatty, Skanska, Atkins, and Egis; and
- FLOW – Vinci, Laing Roads, Carillion, and Costain.

Bid evaluations

2.5 The Agency designed its bid evaluation process to identify the bid with the best combination of quality and price.The Agency initially found that all three of the bidders were technically non-compliant due to misunderstanding requirements. It ran a limited re-bid in January 2008, causing delays of around six weeks but avoided a full re-tender.

2.6 The Agency carried out a financial evaluation on bids meeting its quality threshold. FLOW did not meet this threshold and the Agency did not assess it further. The cost range produced by the Agency's benchmark cost model was between 27-43 per cent more than the lowest adjusted qualifying bid (**Figure 6** overleaf sets out the unadjusted and adjusted bids). The Agency concluded that this demonstrated the bids were good value for money. Whilst the bids were significantly below the cost model, the model did not represent a challenging benchmark. The Agency's low estimate of operation and maintenance costs, based on the Agency's previous experience, was between £1.0 billion-£1.5 billion higher in cash terms, than the costs assumed by the bidders.

2.7 The Agency commissioned a report to compare its estimates with the bids. This identified a number of issues in the preparation of the Agency's cost data. The Agency satisfied itself that the lower priced bids were robust but did not carry out detailed analysis of the reasons for the differences from its estimates.

Figure 6
Comparison of standard tenders to the Agency's estimates

	Quality score	Present value cost of unadjusted standard tender[1] (£bn)	Present value cost of adjusted bids[1] (£bn)	Difference from cheapest compliant adjusted bid (£bn)	(%)
FLOW	62	2.6	–	–	–
ALF	65	2.7	3.1	0.1	3
Connect Plus	74	2.7	3.0	–	–
Agency expected cost ranged from:					
Low operation and maintenance costs		3.8	3.8	0.8	27
High operation and maintenance costs		4.3	4.3	1.3	43

NOTE
1 Using a discount rate of 3.5 per cent.

Source: Highways Agency

2.8 The Agency did not intend to use its benchmark cost model to estimate the likely cost of a privately financed solution. In our experience an accurate 'should-cost' model for private finance projects can help in planning financial resources and bid negotiations as well as assisting the identification of ways in which conventional procurement can be improved. This is particularly critical in the current environment of spending constraints.[8]

2.9 The Agency adjusted and ranked Connect Plus's and ALF's standard and variant bids. The bids were close: Connect Plus's best adjusted bid had a net present cost of £3.021 billion, while ALF's was £3.057 billion. The Agency selected Connect Plus as Provisional Preferred Bidder (announced in May 2008), as it offered better quality at a lower price.

The credit crisis

Timetable

2.10 After the Government announced its intention to proceed with the widening of five sections of the M25 in July 2003 and asked the Agency to carry out further development work, the schemes entered the targeted programme of improvements in April 2004.The Agency's initial 2004 timetable anticipated construction of the first section starting in May 2007 which we consider was a reasonable timetable to aim for. When the Agency drew up its 2004 timetable it had not decided on the procurement strategy. The Agency then decided to widen four of the sections using private finance. It attempted to shorten

8 We referred to concerns over the Agency's lack of information on the cost of its maintenance work in our report *Contracting for Highways Maintenance*, HC 959, 16 October 2009 published after the letting of the M25 widening contract.

the procurement timetable by avoiding additional stages in the procurement. However, it spent more time than it had expected preparing the procurement. By May 2005 when it was consulting industry, it had put back its expected construction start to May 2008. The contract was not let, however, until May 2009.

2.11 The procurement started in autumn 2005 around nine months later than the Agency's initial plan. From contract advertisement in November 2005 to award in May 2009 took 42 months compared with a targeted 29 months (45 per cent increase). This slippage, however, included around six months additional time needed to arrange financing during the credit crisis. The Agency's view is that its original timetable, which would have seen the contract delivered before the credit crisis, was demanding for a project of this size and the new issues which had to be addressed. These issues were letting a large road contract where the Agency would be the operator of the road, running a financing competition and developing a new payment mechanism. The Agency's advisers consider that the original timetable was very challenging; the bidders told us, however, that the original timetable was generally reasonable for them. We consider the initial timetable was reasonable bearing in mind the Department also had two years from Government approval in 2003 to work with the Agency to prepare for the procurement before it was advertised.

2.12 The Agency identified its Provisional Preferred Bidder in May 2008, nine months behind schedule. A number of factors contributed to this delay, most of which related to difficulties finalising complex tender documents. There were particular problems around pricing the later upgrade sections, and the operation of the Dartford Crossing (further details on the nature of the delays to the procurement can be found on our website).[9]

2.13 As a result of delays in both preparing and executing the procurement before the credit crisis, the Agency exposed the project to the risk of changing market conditions for around 18 months longer than its initial timetable, a timetable we judge as having been reasonable.

Increased cost

2.14 In the second half of 2008, soon after the appointment of Connect Plus as preferred bidder, the credit crisis left Connect Plus attempting to finance the project in a very uncertain banking market. Banks had fewer funds available to lend and, as we have recently reported, the cost of long-term project finance increased significantly.[10]

2.15 The Agency remained keen to award the contract before the end of 2008, and worked with Connect Plus to obtain financing from a club of 16 banks. By December 2008, banks had only offered around half of the financing required. The Department offered to lend up to £500 million to bridge the gap. This offer was beneficial in closing the deal. It demonstrated to banks that the Agency was committed to the deal and had a contingency plan to support the deal. This helped to deliver market confidence for completing the private financing of subsequent projects across government but, as our recent financing report showed, these projects bore much higher financing costs than before the credit crisis.

9 www.nao.org.uk/M25-2010
10 *Financing PFI projects in the credit crisis and the Treasury's response* HC 287, July 2010.

2.16 The price of the contract increased by £662 million from a present value cost of £2.7 billion when Connect Plus became preferred bidder to £3.4 billion at contract letting (**Figure 7**). The Agency and Connect Plus worked hard to obtain financing terms broadly in line with market terms following the credit crisis.[11] These were, however, much more expensive terms than before the credit crisis and accounted for £444 million (67 per cent) of the price increase. The interest margins for project risk increased from an expected 0.7-0.85 per cent at Preferred Bidder stage to 2.5-3.5 per cent at contract letting.

Figure 7
Increase in price between Preferred Bidder and contract award

	Present value cost[1,2] (£m)	Cost of change (£m)	Percentage of total change (%)
Contract price at Preferred Bidder	**2,699**[4]		
Changes			
Bank margins, term lengths and financing fees		444	67
Other financing related costs[3]		216	32
Cost inputs and construction dates		84	13
Other adjustments		-82	-12
Total change	**662**		
Contract price at award	**3,361**[4]		

NOTES

1 2007 prices.

2 Using a discount rate of 3.5 per cent.

3 For example, base rate movements, swap margins and reserve requirements, and changes to the ratio of interest to income.

4 In non-discounted cash terms, the contract price increased from £7.4 billion to £9.6 billion.

Source: Highways Agency

2.17 The remaining price increase of £218 million mainly related to changes made by the banks to reduce their risk. They reduced their risk by requiring:

- Connect Plus to increase its price to take into account the risk of higher inflation above the retail price index on labour and energy costs over the life of the contract. This had a present value cost to the Agency of around £80 million over the life of the contract.
- Connect Plus to increase its ratio of income in relation to debt service costs. The Agency is paying Connect Plus more to enable it to meet this requirement, but there is a rebate mechanism which will enable the Agency to recover these additional payments assuming the project performs satisfactorily.
- Connect Plus's shareholders to increase their investment from £106 million to £200 million with a fall in their internal rate of return on equity from 17.8 per cent to 15.0 per cent.

11 *Treasury response to the credit crisis*, HC 287, July 2010.

2.18 The Agency accepted other risks which it had planned to transfer to Connect Plus. It estimated that it is likely to incur a present value cost of £68 million from these risks. This extra cost is not included in the contract price.

2.19 The Agency negotiated a 50-90 per cent share of refinancing gains, depending on the size of the gain. The Agency saw this as an innovative sharing mechanism which gave the potential for a higher government share than the Treasury guidance which, since the credit crisis, has expected a 70 per cent public sector share. There are, however, constraints which make it, in our opinion, improbable that the Agency would achieve more than a 70 per cent share given likely future financing conditions. There is no certainty that refinancing will take place, but if it does, we estimate it may allow the Agency to recover potentially around £100 million through its refinancing gain share. This is lower than the Agency's estimate of £200 million.

Decision to let the contract

2.20 During late 2008 and early 2009, the Agency continued to assess whether to let the deal. The Agency's decision to continue reflected its view that, despite the price increase, the deal remained value for money. It also took into account:

- ongoing doubts about the technical suitability of the alternative of hard shoulder running for Section One;
- its concern that cancelling the project would adversely affect its reputation for procuring road projects and would lead to higher costs on other deals;
- the Government's general policy in early 2009 to let construction contracts to stimulate the economy;
- its concern that delaying the deal would result in a loss of benefits that the widening would bring; and
- the Department's consideration that the M25 widening is a high priority use of funds compared with other projects.

Comparison with conventional procurement

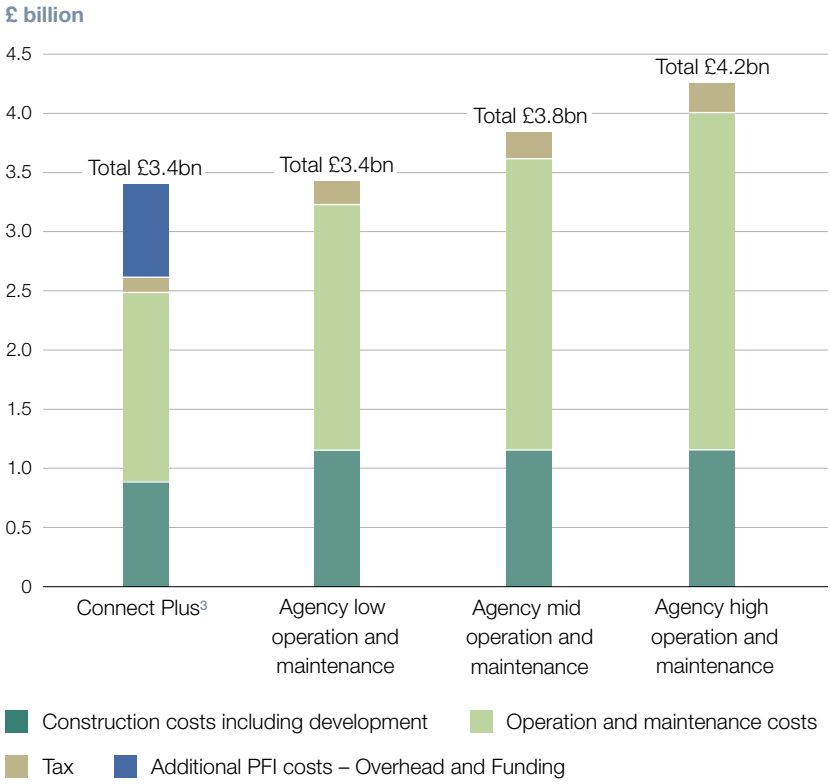
2.21 The Agency based its view that the deal was still value for money on a comparison of Connect Plus's price of £3.4 billion against an updated estimate that the cost of procuring the widening conventionally, through multiple contracts, would fall within a range of between £3.4 billion and £4.2 billion (**Figure 8** overleaf).[12] The comparator was updated from the Agency's 2004 estimate, which was £3.6 billion in 2006 prices.[13] In updating its comparator the Agency drew on operation and maintenance cost information in its benchmark cost model.

12 In an answer to a question in Parliament in June 2009 the Agency assumed that operation and maintenance cost would have been in the middle of its range for conventional procurement costs to demonstrate that the private finance solution at £3.4 billion was cheaper than a conventionally funded solution at £3.8 billion.

13 It had been £2.7 billion in 2001 prices (Figure 3).

Figure 8

Final value for money comparison of Connect Plus's bid to a conventionally procured option



NOTES

1 2007 prices.

2 Using a discount rate of 3.5 per cent.

3 The present value of construction cost, including development, in Connect Plus's bid was £0.9 billion. Operational and maintenance costs were £1.6 billion.

Source: National Audit Office analysis of Highways Agency data

2.22 There were, in our opinion, other factors which the Agency should have considered in its comparison:

- The present value of the Agency's lowest estimate of operation and maintenance costs was £0.4 billion higher than Connect Plus's equivalent costs in its final bid. We consider that there should have been scope for reducing the Agency's estimate of these costs under conventional procurement as the market was becoming more competitive in the economic downturn of 2009. In addition, in pricing the contract when its financing costs rose in the credit crisis, Connect Plus built in conservative assumptions for maintenance costs over the full 30 years of the contract. The Agency considers, however, that renewing conventional maintenance contracts every five years would lose efficiencies which a single contractor can deliver over 30 years.

- The private finance cost excluded the £68 million for risks the Agency had accepted back in addition to the contract price.

Use of advisers

2.23 Throughout the procurement, the Agency relied heavily on advisers, spending £80 million (excluding VAT) on 40 organisations involved between April 2004 and March 2010, including £65 million on its key advisers (**Figure 9**).

Figure 9

External procurement and development costs (excluding VAT) between April 2004 and March 2010

Category	Adviser	Total spend (£m)
Legal	Denton Wilde Sapte LLP	14
Financial	PricewaterhouseCoopers	6
Technical excluding design works	Hyder Consulting	21
	Halcrow Group	
	Hyder Halcrow Joint Venture	
Total key advisers costs excluding design works		**41**
Technical advisers' design works		24
Other organisations		15
Total costs		**80**

Source: National Audit Office analysis of Highways Agency data

2.24 We have previously reported that the average cost of advisers on private finance projects reaching financial close between April 2004 and May 2006 was 2.6 per cent of the project's capital value.[14] The Agency's adviser costs were 7.5 per cent of the capital value.

2.25 We are concerned that the Agency is too reliant on advisers. It has used the same advisers on most of its private finance roads contracts, and benefited from their expertise. However, the Agency lost key staff with private finance experience, leaving the advisers in a strong position to drive the process. Bidders reported surprise at the advisers' level of control. Throughout our study, the Agency often referred us to its advisers for a detailed explanation of issues. We previously raised the Agency's reliance on advisers in 2008.[15] The Agency's reliance on advisers has built up over time and in part reflects insufficient commercial and technical skills within the Agency. This creates risks that advisers hold too much project knowledge, and control projects.

14 *Improving the PFI tendering process*, HC 149, March 2007.
15 *The Procurement of the National Roads Telecommunications Services*, HC 340, April 2008.

2.26 The Agency did not set a total budget for the procurement, considering there were uncertainties about the cost; instead it budgeted on an annual basis. Despite controlling annual expenditure, the Agency has not reviewed the total costs of the procurement and has been able to provide only limited information on internal costs.

Managing the contract

Construction performance

2.27 Construction work is generally proceeding in line with the timetable. Under the contract, Connect Plus has to have the M25 free of traffic management for the 2012 Olympics. The Agency needs to monitor the work carefully to ensure that Connect Plus manages the timetable.

Operational performance

2.28 Connect Plus began operating and maintaining the M25 in September 2009. By 31 October 2010 the Agency had paid Connect Plus £113 million. The Agency deducted £1.2 million for performance against the lane availability and road condition indicators, and awarded Connect Plus a bonus of £2.6 million for good performance on critical incident management. Details of the main elements of the payment mechanism and performance monitoring are included on our website[16], together with other contract management issues.[17]

Demand management project

2.29 In 2002, Kellogg, Brown and Root recommended that the Government should only widen the M25 in conjunction with measures to control demand. They estimated 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. Traffic typically grows by 2 per cent a year on the M25 and experience from previous M25 widening schemes shows that additional capacity fills up quickly. For example, when the section between junctions 9 and 10 was widened, in the year of opening traffic grew to fill completely the additional capacity at peak-times.

2.30 The Agency expects the widening 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 shows that, taking account of traffic growth and without demand management, the overall benefits to traffic throughput peaks in 2021, six years after the expected completion date of the construction. Thereafter, benefits fall as additional traffic fills up the road.

2.31 The Agency and the Department have not made significant progress since committing to explore demand management in 2003. The Agency favoured managing demand on the M25 through integration with the local road network.

16 www.nao.org.uk/M25-2010
17 www.nao.org.uk/M25-2010

2.32 The Agency initially considered it desirable that these demand management measures should be developed and agreed with local authorities by summer 2006. In December 2008, the Office of Government Commerce found that successful delivery of these measures appeared unachievable. It recommended changing the scope to a 'proof of concept' scheme. The Department is now working with local authorities in Surrey on a £40 million project to test a toolkit of measures to manage traffic in a coordinated way.

2.33 It is not yet clear, whether the more ambitious techniques to manage demand across the M25 and local road network will be feasible. The Agency is not expecting results from the demonstration project until May 2012, around the completion of the first sections of widening.

2.34 The Agency sees the demand management project as delivering additional benefits in reducing M25 congestion at additional costs. We note, however, that the early implementation of demand management is important to ensure that the long-term benefits of the widening project are maintained. There are risks to maintaining the long-term benefits of widening from the Agency's decision to widen without proving it could manage demand.

Part Three

Management of the procurement: consideration of alternative solutions

During the bidding process

3.1 Private finance projects usually define the outputs required allowing flexibility over the solution. The Agency, however, asked bidders to specifically price a road widening solution, but sought to encourage innovation through variant bids. The bidders told us that their impression, however, was that the Agency focused on the widening, and pursued only limited variants. In early 2007, one of the bidders, FLOW, asked if it could submit a variant bid offering extra capacity through use of the hard shoulder. The early results of the Agency's hard shoulder running trials on the M42 were positive. On average delays were reduced by 15 per cent and journey time variability reduced by 35 per cent.

3.2 The Agency initially considered asking the tenderers to prepare alternative bids for Active Traffic Management whilst it investigated the merits of the approach further. At the time, the Agency considered that Section One was unsuitable for hard shoulder running, due to high traffic flows and closely spaced junctions, but wanted to mandate a compulsory variant bid for the remaining sections. While the Agency estimated that Active Traffic Management would save £300-£440 million on the capital costs for the other sections due to reduced construction, it eventually recommended continuing with the widening procurement because:

- It received advice that it could be exposed to a legal challenge because the variant was a material change to the competition, as the procurement advertisement required bidders to increase M25 capacity by widening specified sections.
- Despite the encouraging early results, there was insufficient data from the M42 trial to reach a firm conclusion on the costs and benefits of Active Traffic Management. A formal report on the monitoring and evaluation of Active Traffic Management was not available to the Agency until October 2007.
- The M42 trial was running at 50 miles per hour on all lanes when the hard shoulder was in use. The Agency considered that, at the time and at this speed, Active Traffic Management would only offer around 35 per cent of the benefits of the widening and capital savings of 23-34 per cent. The Agency acknowledged that hard shoulder running at higher speeds would increase the benefits. At 60 miles per hour the benefits would increase to 80 per cent. Speed limits are needed to address safety issues.

3.3 The Agency recognised that this decision would leave it open to the challenge that there could have been a better value for money solution for the M25. In our view, the Agency did not allow sufficient flexibility in its initial procurement advertisement to pursue bidders' alternative technical solutions. The Agency considers it was unable to do so as it required robust trial data and appropriate engineering standards to specify the detailed requirements.

When confirming the widening solution in 2008

3.4 In March 2008, the new Secretary of State for Transport requested reassurance on the decision to proceed with the widening. In supporting the case for widening Sections One and Four the Agency estimated that the savings from using Active Traffic Management would be offset by other costs (**Figure 10** overleaf). We consider these calculations were a very cautious estimate as:

- The Agency offset maintenance costs over 30 years against upfront savings, without carrying out a discounted cash flow. This overstated the offsetting costs.
- It is questionable whether the £140 million of additional costs to other projects would arise.

3.5 The Agency was also awaiting a further report on the evaluation of the trial that was due in July 2008. Until this further data became available, the Agency concluded that there was insufficient information to carry out a full economic, safety and environmental appraisal.

During 2009

3.6 The M42 results proved to be positive with journey times improved by up to 24 per cent and journey time variability reduced by 22 per cent on average. In 2009, following further trials on the M42 at 60 miles an hour and a feasibility study, the Department published a strategy for applying Active Traffic Management to a number of motorways formerly considered for widening. The Agency had identified hard shoulder running as a possible solution if it was unable to close its widening deal during the credit crisis, although it continued to doubt whether Section One would be suitable for the new technique because of high traffic flows.

3.7 The Agency now expects to use hard shoulder running for the two other sections (Sections Two and Five) of the M25. This is part of a £3.7 billion programme of projects, which are under way or planned, to use the technique on ten major roads.

3.8 The Agency has been thorough in its testing of Active Traffic Management and had to overcome the resistance of certain stakeholders to the new technique. We consider, however, the progress was very slow given that the technique has been used in Europe, the first trials being in 1996, and that the Agency announced its intention to trial the technique in 2001. The Agency considers that its rate of progress was appropriate in order to complete rigorous trials.

Figure 10

The Agency's estimates of the costs and savings from Active Traffic Management for Sections One and Four of the M25 in March 2008

	Saving/ cost (£m)	Notes
Capital cost savings on Section One and Four	**330**	Assumes the Agency would still carry out other planned improvements, such as improved drainage and low noise surfacing across all running lanes.
Additional costs		
Maintenance costs over 30 years	-193	Assumes the Agency would procure maintenance for the whole motorway under five-year Managing Agent Contracts, leading to a 5 per cent increase in costs.
Reimbursement of bid costs	-40	
Revised engineering costs	-10	
Net savings before further programme adjustments	**87**	
The Agency then made further assumptions on possible costs which could offset the £87 million savings		
Increase of 1.5 per cent on the capital cost of the Department's private finance programme	-90	The Agency assumed that cancellation of the M25 widening contract would lead to market uncertainty and an assumed increase in financing costs on the Intercity Express Project, Thameslink rolling stock and the Local Authority private finance initiative programme.
An assumed 0.5 per cent higher pricing for the Agency's private finance programme	-50	The Agency assumed that the cost of its own programme would increase because bidders would increase their prices due to the risk of cancellation.
Total cost on other projects	**-140**	
Net additional cost of using Active Traffic Management	**-53**	

Source: Highways Agency

Comparison of widening contract with hard shoulder running

3.9 The Agency's slowness in completing trials of hard shoulder running, and its procurement approach which focused on widening, meant that it was not in a position to seriously consider hard shoulder running as an alternative to widening, The Agency should have given greater consideration to hard shoulder running from the outset of its project. Even in late 2008 and early 2009, when the Agency had satisfied itself on the general benefits and savings of hard shoulder running, we believe it should have given greater consideration to the approach before its final decision to let the widening contract.

3.10 We do not consider that the Agency's cost estimate in 2008, that hard shoulder running was not expected to deliver financial savings (Figure 10 opposite), was a sufficiently thorough assessment of the savings that an acceptable conventionally procured hard shoulder running solution could provide.

3.11 We estimate there were potential construction and financing savings to consider of £400-£700 million (12-21 per cent) over the private finance widening. This takes account of the Agency's assessment that implementing hard shoulder running has produced savings of around 40-60 per cent of the capital costs of widening although it also considered that further savings may be achievable.[18] We also consider that there was scope for the Agency to achieve operation and maintenance efficiencies more in line with the costs expected by the private finance bidders. The potential savings over the M25 widening contract would then increase to between £800 million and £1.1 billion (24-32 per cent) if the low end of the Agency's cost estimates of conventional procurement is reduced by £400 million in line with Connect Plus's final bid. Details of our calculation can be found in Appendix 3. The Agency considers these efficiencies in operation and maintenance costs could not have been achieved through short-term conventional contracts.

3.12 An evaluation of hard shoulder running should consider any change in benefits from using this technique rather than widening. The benefits assessment needs careful consideration. The results of the Agency's trials on the M42 showed some reduction in benefits was to be expected. There was, however, considerable variation in the benefits that hard shoulder running can deliver at different speeds. The Agency did not have a detailed assessment of the benefits that could be achieved from using hard shoulder running on the sections of the M25 that were being widened.

18 Department for Transport – *Britain's Transport Infrastructure Motorways and Major Trunk Roads,* January 2009.

Appendix One

The M25 Widening Project: Timeline of events

Year	Month	Related events	The Active Traffic Management (ATM) Project – Related events	NAO comment
1996			Netherlands and Germany introduce trials of hard shoulder running	
1997				
1998				
1999				
2000	August		ATM announced	
		Orbit Report commissioned	Agency considers M25 for the ATM trial but rejects it in favour of the M42	
2001	July		Department announces M42 ATM trial	Five years after it had been trialled in Europe
2002	November	Orbit Report published		
2003	March		Construction begins on the M42 ATM trial	
	July	Secretary of State responds to the Orbit Report. The Government announces its intention to proceed with the project to widen five sections of the M25		
2004	April	The five M25 widening schemes enter into the Highways Agency Programme. Construction expected to start in May 2007. The procurement strategy has not been decided at this stage		
	November		NAO reports that the Agency is too risk-averse in testing measures such as ATM	

Year	Month	Related events	The Active Traffic Management (ATM) Project – Related events	NAO comment
2005	May	Construction start put back to May 2008 during consultation with industry. The Agency had by now decided to widen four sections using private finance		
	July	Section 3 M25 : Contract awarded to Costain	ATM construction finished	
	November	M25 Notice in the Official Journal of the European Union	Three lane variable mandatory speed limits in place on M42	
2006	September		The Agency introduces hard shoulder running on the M42	Five years after the Agency's trial was announced
2007	May	One of the M25 bidders asked if it could submit ATM variant bid Agency concludes that ATM should be seriously considered Agency considers mandating a compulsory variant for ATM		
	June	Legal advisers state that allowing ATM variants could be challenged in the courts. The Agency recommends to the Secretary of State to proceed with the widening and to disallow the variants		
	June	Work begins on Section 3 of the M25		
	July	Secretary of State in response to the Agency's recommendation confirms his approval to proceed with the widening Agency declines the ATM variant		
	October		Interim six month report on the monitoring and evaluation of Active Traffic Management published	

Year	Month	Related events	The Active Traffic Management (ATM) Project – Related events	NAO comment
2008	March		Advanced Motorway Signalling and Traffic Management Feasibility Study (ATM feasibility study) identifies a number of sections of the motorway network that would benefit from controlled use of the hard shoulder	
	March	Secretary of State asks for reassurance on widening rather than using ATM. Agency recommends proceeding with the widening and the Secretary of State agrees		
	May	Preferred bidder selected		
	July	Construction widening work on Section 3 of the M25 completed	12 month report on the evaluation of the ATM trial published	
	October		60mph hard shoulder running in place on M42	
2009	January		Britain's Transport Infrastructure Motorways and Major Trunk Roads published stating that ATM will be rolled-out nationally identifying savings on average of 40 per cent but up to 60 per cent over widening	Eight years after the Agency's trial was announced, 13 years after trials started in Europe
	May	ATM likely to be used for Sections 2 and 5 of the M25		
	May	M25 contract awarded		

Appendix Two

Methodology

Our main research methods are outlined below. Further details are on our website www.nao.org.uk/M25-2010.

Method	Work carried out
Document review	We reviewed the key documents relating to the procurement including the Invitation to Tender, bid summaries, the evaluations, and correspondence between the Agency and the Department.
Semi-structured interviews	Highways Agency procurement and operational teams, and its advisers: Department for Transport Connect Plus Bidders
Quantitative and financial analysis	We carried out financial analysis to support a number of areas of the report, including analysis of the Agency's value for money comparisons, the bids, the Agency's spend on advisers, and Connect Plus's early operational performance.
Benchmarking	We have benchmarked various areas of the Agency's performance, including: spending on advisers procurement timetable financing margins on the M25 contract to other deals

Appendix Three

National Audit Office estimate of potential savings the Agency could have achieved by implementing hard shoulder running

1 We used the same methodology and financial model that the Agency used to assess the value for money of the M25 project. We made low and high estimates of savings in net present cost to produce a range of values (**Figure 11**).

Figure 11
Potential present value of savings against the private finance solution

	Agency's original estimate of conventional widening project	Scenario with operation and maintenance cost in line with the Agency's estimates[1]		Scenario with operation and maintenance cost in line with the Private Finance bidders[2]	
Capital savings from hard shoulder running	0%	40%	60%[3]	40%	60%[3]
	(£bn)	**(£bn)**	**(£bn)**	**(£bn)**	**(£bn)**
Capital Cost[4]	1.2	0.8	0.5	0.8	0.5
Operation and maintenance cost	2.0	2.0	2.0	1.6	1.6
Other items	0.2	0.2	0.2	0.2	0.2
Total	**3.4**	**3.0**	**2.7**	**2.6**	**2.3**
Signed private finance contract	3.4	3.4	3.4	3.4	3.4
National Audit Office Savings estimate	**0.0**	**0.4**	**0.7**	**0.8**	**1.1**

NOTES

1 Based on the Agency's low estimate of operation and maintenance cost.

2 While maintenance savings based on greater efficiencies are included in our calculations we have not included possible further maintenance savings from hard shoulder running compared with widening. This is because of uncertainties over such savings.

3 The Agency considers 60 per cent savings would be dependent on a large programme of widening rather than a single project.

4 A small proportion of capital cost is not subject to the percentage savings.

5 The figures are expressed in 2007 prices using a discount rate of 3.5 per cent.

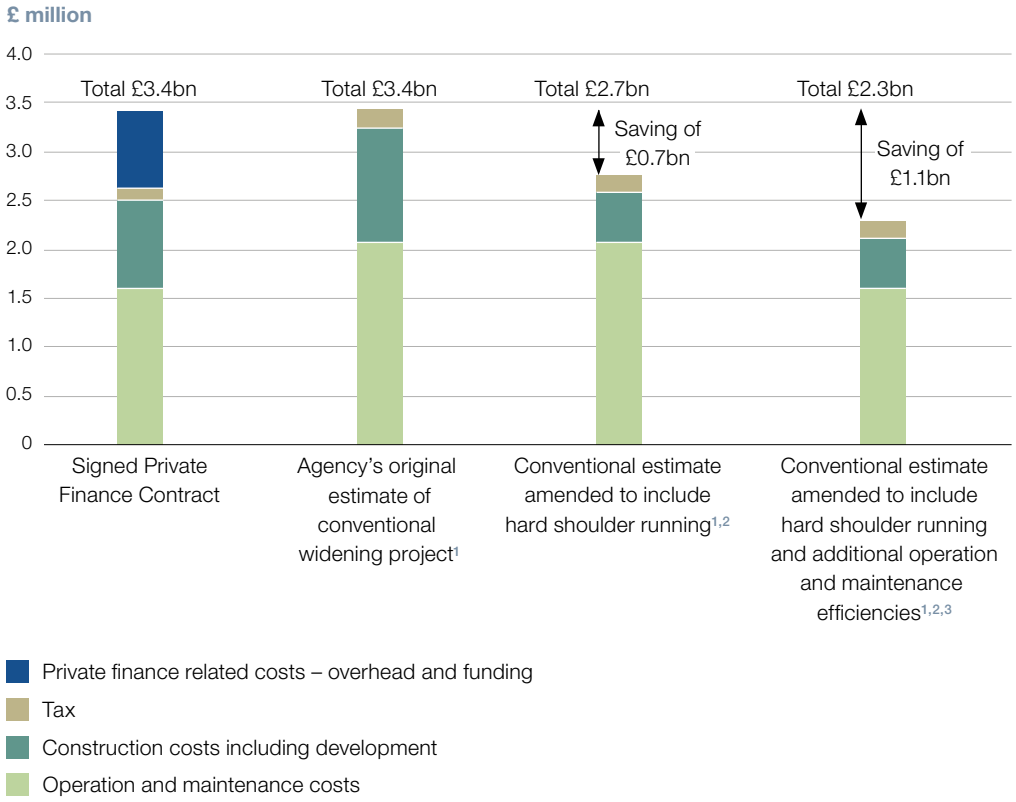
6 The Agency had proved in its M42 trial that hard shoulder running at 60 miles per hour would deliver 80 per cent of the benefits of widening. The benefits from using this technique on the M25 would need further evaluation.

Source: National Audit Office

2 The high savings scenarios have been presented graphically in **Figure 12**.

Figure 12

Graphical representation comparing our estimates of a conventionally funded hard shoulder running contract against the Connect Plus contract price



NOTES

1 Based on the Agency's low operation and maintenance cost estimate.

2 Assumes 60 per cent capital savings.

3 Assumes operation and maintenance efficiencies the same as private finance bidders.

4 2007 prices using a discount rate of 3.5 per cent.

Source: National Audit Office

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