

High Speed 2 Strategic Alternatives Study

Highway Interventions Report

March 2010

Notice

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1. Introduction

1.1 Background

At the start of 2009, HS2 Ltd was established to investigate the case for a new high speed railway between London, the West Midlands and potentially beyond. Subsequently, Atkins was appointed by the Department for Transport (DfT), to consider, at a high level, potential road and rail improvement options as potential strategic alternatives to a high speed rail proposition. This study therefore looks at a range of road and rail interventions between London and the West Midlands, which could effectively increase capacity in line with forecast demand.

1.2 Purpose of the Report

This document is concerned with identifying potential road interventions only. It builds on the 'HS2 Strategic Alternatives Study - Baseline Report' in detailing interventions already planned up to 2031, and examining likely levels of forecast demand. It then identifies additional interventions required to improve the road offering, as an alternative to constructing a High Speed Rail Line and sets out a proposal for combining schemes into packages for testing purposes.

The Highway interventions adopted in this report are of two types to accord with current best practice and government policy to make best use of the existing highway network. The interventions are:-

- Installation of gantries, signs and associated equipment to permit "Hard Shoulder Running" to be implemented; or
- On-line widening of the motorway network incorporating full standard cross section, junction improvements and bridges widened/replaced.

It is assumed that the above interventions would be substantially accommodated within existing highway boundaries.

This report focuses solely upon how interventions have been identified and packaged. The assessment of these interventions is reported in the Strategic Outline Case report.

More radical options, such as the construction of a new motorway between London and the West Midlands, or the introduction of road tolling on parts of the motorway network have not been considered as part of this study.

1.3 Structure of this Report

The remainder of this report is structured as follows:

- Chapter 2 outlines the network supply (including currently planned interventions) and demand for 2008, 2021 and 2031;
- Chapter 3 discusses the need for improvements to the network, based on an analysis of future year demand;
- Chapter 4 suggests potential packages of improvements; and,
- Chapter 5 draws conclusions and summarises the work undertaken in this task.

2. Do Minimum Assumptions

2.1 Supply

2.1.1 Introduction

The assumptions used for this HS2 Strategic Alternatives Study are consistent with the assumptions underlying the HS2 Ltd study, so that the potential solutions can be compared with each other.

In developing the future year Do Minimum road network for input into the study Multi-Modal Transport Model, two key sources of data are used:

- The Highways Agency Business Plan 2009-10; and
- Transport schemes which were included within the National Transport Model (NTM).

For the HS2 Ltd study, strategic highway infrastructure schemes across Great Britain were identified for inclusion in the Future Year Do Minimum scenarios. Whilst all of these schemes are included in the Do Minimum scenarios in the model, for the purpose of this study, only those which fall within the study area along the M1/M6 and the M40 between London and the West Midlands have been represented.

Figure 2.1 overleaf shows the existing Base Year (2008) highway network.

2.1.2 2021 Network

Table 2.1 summarises the planned road schemes identified as expected to be operational by 2021. These schemes are shown geographically in Figure 2.2. The status of the highway network in 2021, with these schemes included, is shown in Figure 2.3.

Table 2.1 – 2021 Do Minimum Road Schemes within HS2 Strategic Alternatives Study Area

Scheme	Source	Expected Work Start Date
M1 J21 to J30 Widening (Phase 1)	Construction	2007
Hard Shoulder Running M40 J16 to M42 J3A	Construction	2008
Hard Shoulder Running M42 J7 - J9	Construction	2008
Hard Shoulder Running M6 J4 - J5	Construction	2008
Hard Shoulder Running M6 J8 - J10A	Construction	2008
Hard Shoulder Running M6 J8-10a	HA Business Plan	2009/10
M25 widening J16-23	HA Business Plan	2009/10
M25 widening J27-30	HA Business Plan	2009/10
Hard Shoulder Running M6 J5-8	HA Business Plan	2010
Hard Shoulder Running M6 J10a-13	HA Business Plan	2012
Hard Shoulder Running M4 J3-12	HA Business Plan	2011
Hard Shoulder Running M1 J10-13	HA Business Plan	2009/10
M1 J19 to M6	HA Business Plan	2011
A505 Dunstable Northern Bypass	HA Business Plan	2011
Hard Shoulder Running M25 J23 - J27	NTM	2012
Hard Shoulder Running M1 J13 to J19	NTM	2018
Hard Shoulder Running M6 J13 - J19	NTM	2015
Hard Shoulder Running M5 J4a - J6	NTM	2015
Hard Shoulder Running M6 J2 - J4	NTM	2016

Figure 2.1 - 2008 Existing Motorway Network London – Birmingham Corridor

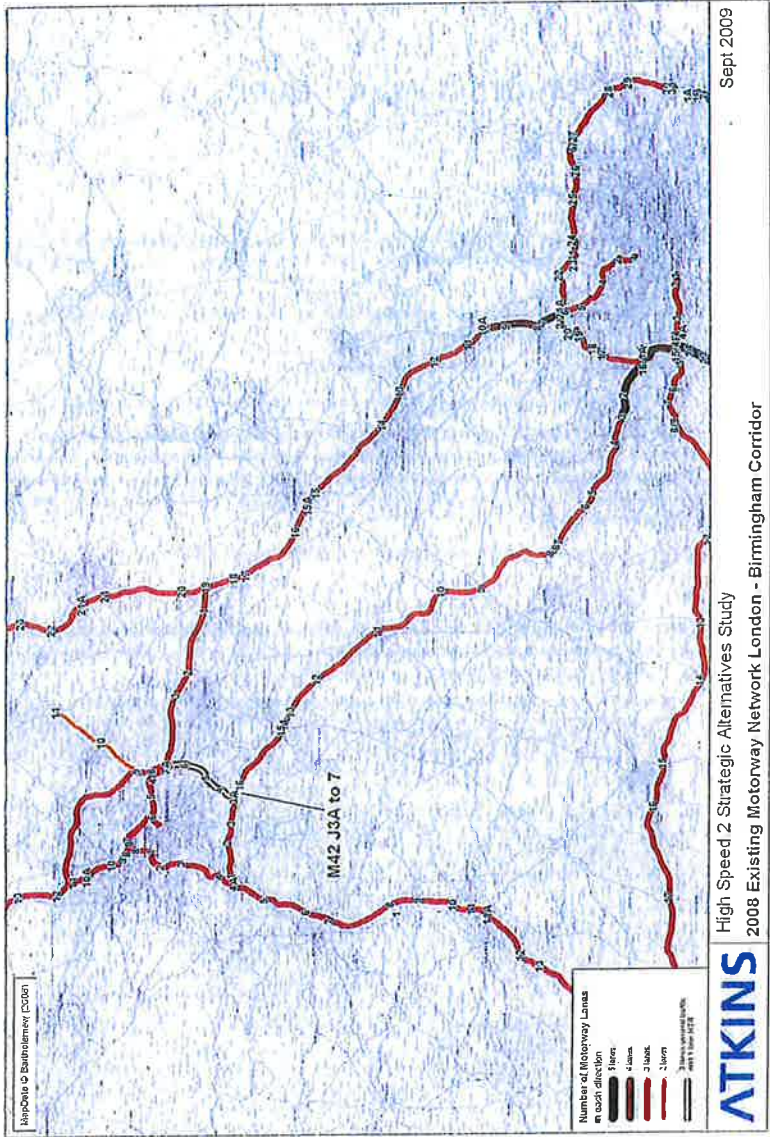
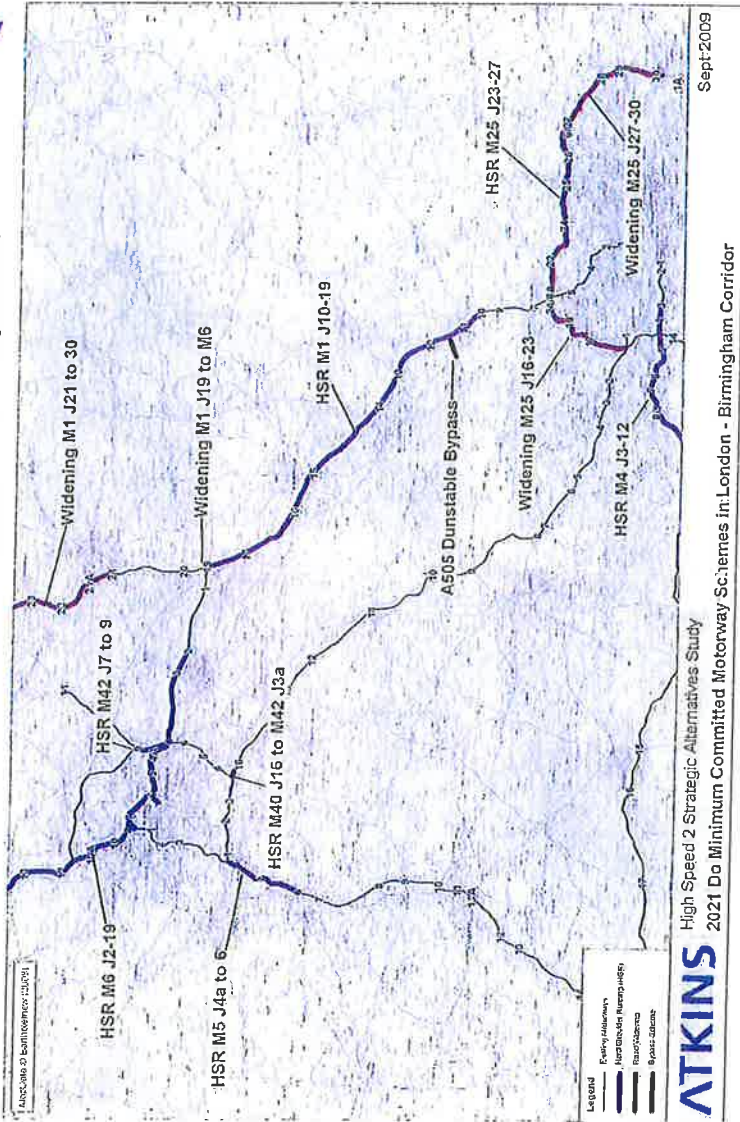


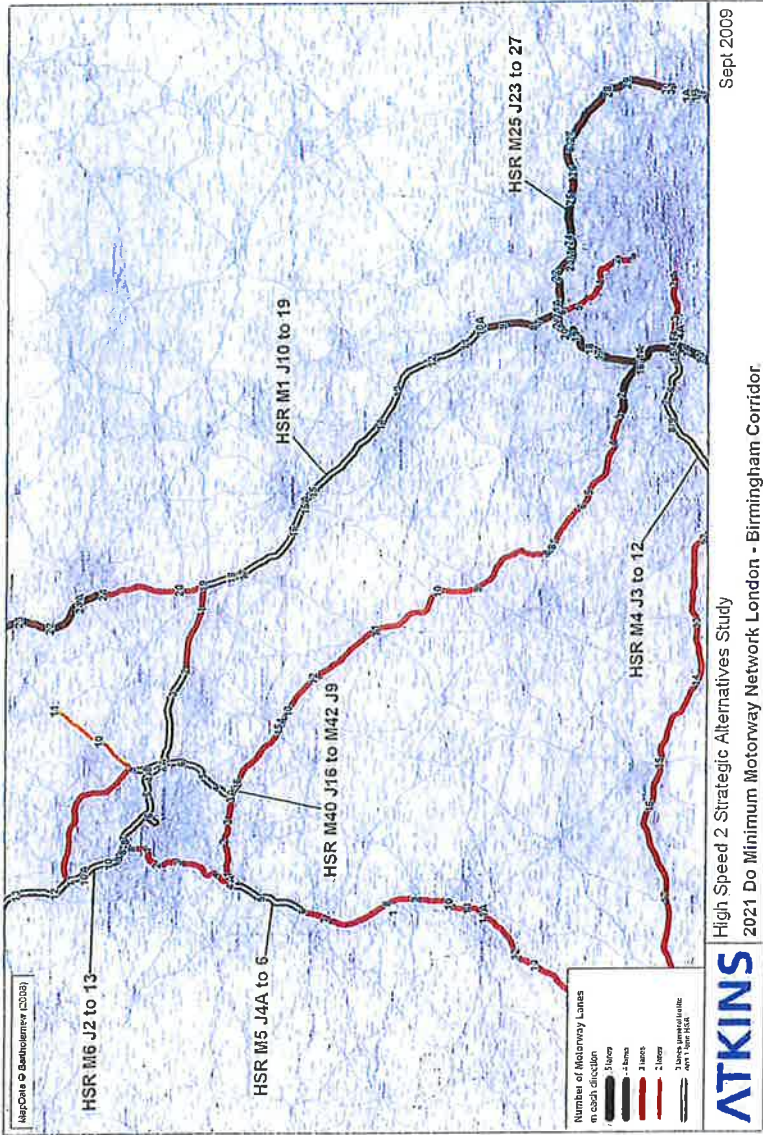
Figure 2.2 - 2021 Do Minimum Committed Motorway Schemes in the London – Birmingham Corridor



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2021 Do Minimum Committed Motorway Schemes in London - Birmingham Corridor

Figure 2.3 - 2021 Do Minimum Motorway Network London - Birmingham Corridor



2.1.3 2031 Network

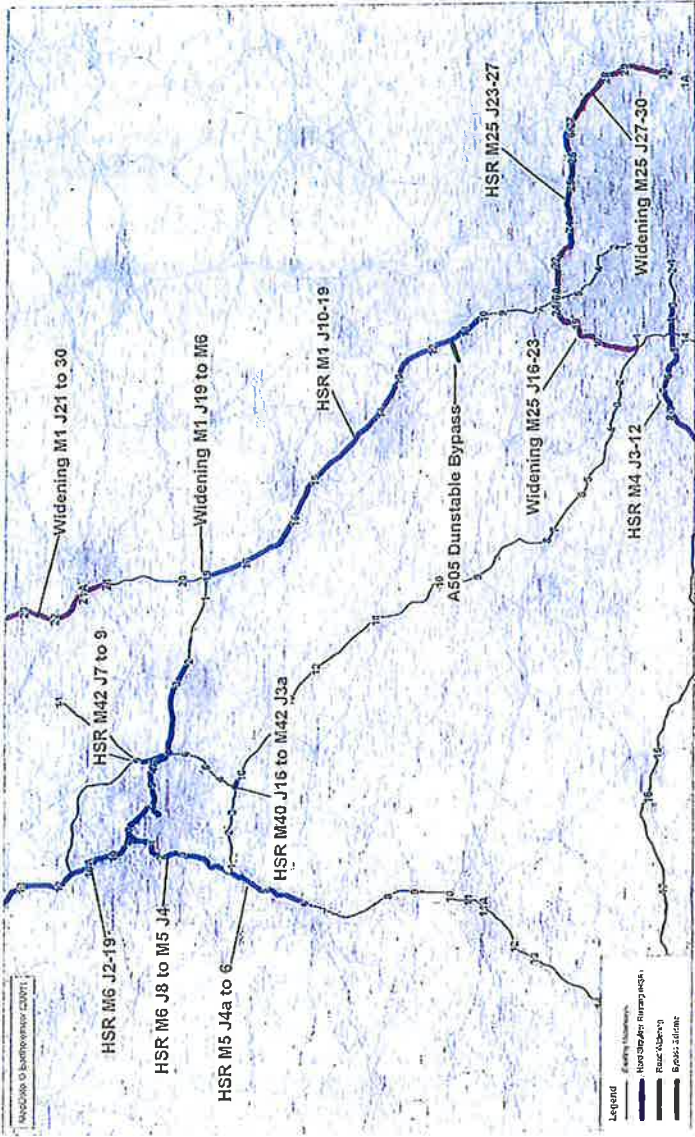
Beyond 2021, the High Speed 2 Do Minimum included two additional road schemes which are within the study area. These are shown in Table 2.2 below. These schemes are shown in Figure 2.4, with the status of the highway network in 2031, following the inclusion of these schemes, shown in Figure 2.5.

Table 2.2 – 2031 Do Minimum Road Schemes within HS2 Strategic Alternatives Study Area

Scheme	Source	Expected Work Start Date
Hard Shoulder Running M6 J8 – M5 J2	NTM	2019
Hard Shoulder Running M5 J2 – J4	NTM	2019

These schemes are not currently being taken forward in the National Roads Programme, as announced in January 2009 (Britain's Transport Infrastructure, Motorways and Major Trunk Roads, DfT). However, they are included in this study for consistency with the High Speed 2 Do Minimum.

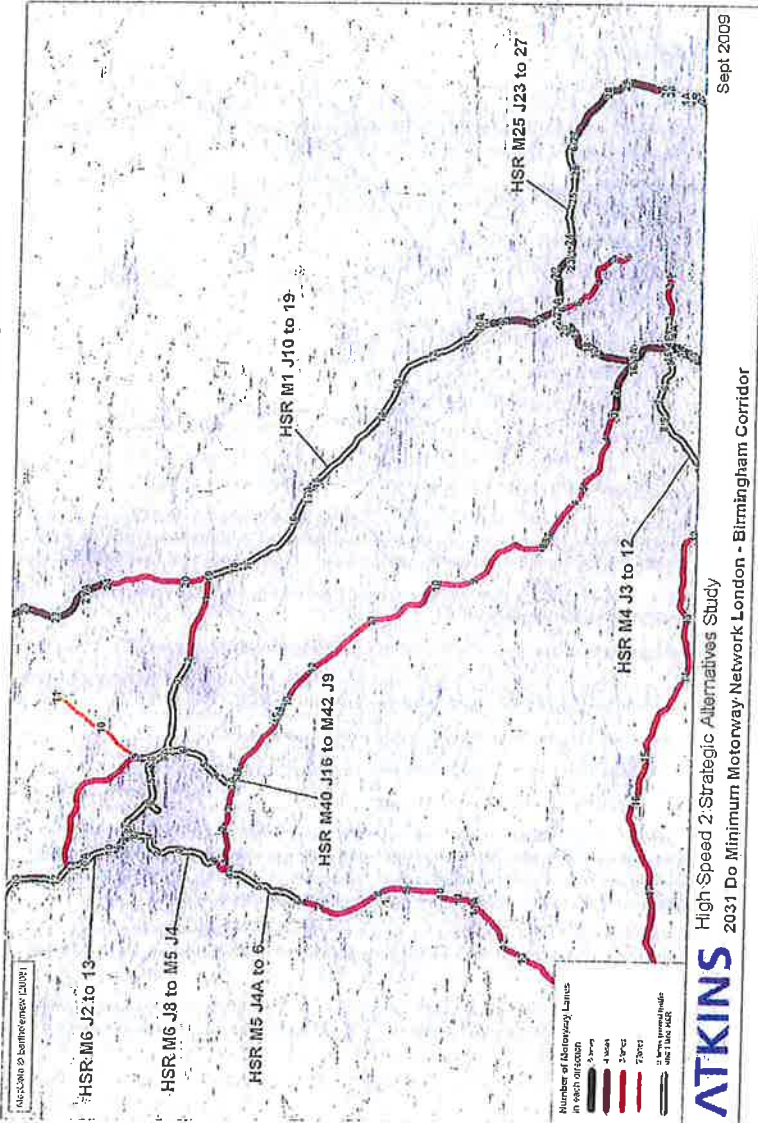
Figure 2.4 – 2031 Do Minimum Committed Motorway Schemes in London – Birmingham Corridor



Sept 2009

High Speed 2 Strategic Alternatives Study
2031 Do Minimum Committed Motorway Schemes in London - Birmingham Corridor

Figure 2.5 - 2031 Do Minimum Motorway Network London – Birmingham Corridor



2.2 Demand

2.2.1 Methodology

In designing potential interventions for analysis later in the study it was decided to build up a picture of future demand directly from current traffic counts. The Highways Agency maintains a comprehensive database of traffic counts, known as TRADS, which covers the majority of the UK motorway network. This was taken as the source of Base Year traffic data.

Observed traffic flow data was extracted from the Highways Agency TRADS database for the year 2008, for sections on the following motorway links, split by direction:

- M1, between Junctions 4 and 21;
- M40, between Junctions 1 and 16;
- M42, between Junctions 3 and 7;
- M5, between Junctions 1 and 4;
- M6, between Junctions 1 and 11;
- M25, between Junctions 15 and 17; and,
- M4, between Junctions 6 and 7.

The Road Transport Forecasts (RTF) essentially presents the demand forecasts for traffic growth from the National Transport Model (NTM).

Growth factors from the Road Transport Forecasts 2008 (RTF 08) were then applied to these observed 2008 traffic flows, producing future year traffic flow forecasts for 2021 and 2031. The use of RTF08 is consistent with the growth applied to future traffic growth in the HS2 Ltd. study.

Future year weekday annual average hourly traffic flow forecasts were calculated for the 16 hour mean and the highest peak hour¹.

There are some weaknesses in this approach, in that it does not take account of:

- any specific employment or population growth points within the study area. Potential issues could be around Milton Keynes and Heathrow;
- any current suppressed demand on the motorway network;
- any potential for re-assignment of trips as a result of improvements; and,
- any potential for peak hour spreading.

It should be noted, however, that this approach was adopted purely for the identification of options and packages for future years. The appraisal of these packages is undertaken using the Department for Transport's National Transport Model (NTM). This is a nationwide strategic assignment model, so will include many of the elements identified above.

The method of predicting future flows is therefore considered to be sufficient to allow packages to be adopted, given that the analysis of these packages is undertaken using a traffic assignment model.

The maximum realistic flow (QC) based on advice from the Highways Agency and considering the COBA manual speed flow curves, has been set at 2,000 vehicles per hour per lane for the purposes of this study.

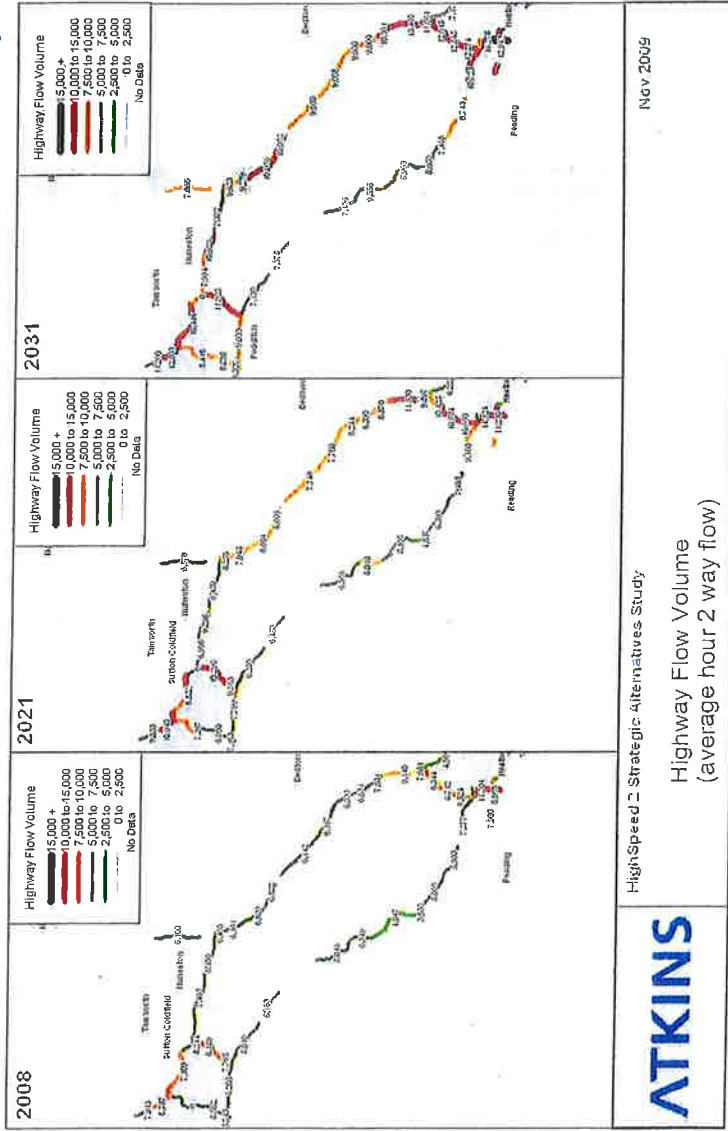
¹ The peak hour differs by motorways section

Volume over Capacity ratios (V/C ratios) of the forecast traffic volume to forecast capacity were calculated by motorway section, direction, forecast year and for the average and peak hour.

Figure 2.6 shows average hourly two way forecast traffic volumes for the years 2008, 2021 and 2031.

Additionally, it is important to understand how motorway flows vary throughout a typical day, since an average hour is likely to be lower than the average annual peak hour. It is also important to recognise that volume over capacity may vary by direction. Therefore, Figures 2.7 and 2.8 show volume over capacity by peak hour and by direction.

Figure 2.6 - Forecast Average Hourly Two-Way Traffic Volumes



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Highway Flow Volume
(average hour 2 way flow)

Nov 2009

Figure 2.7 - Forecast Peak Hour Two-Way Volume over Capacity NB and WB Directions

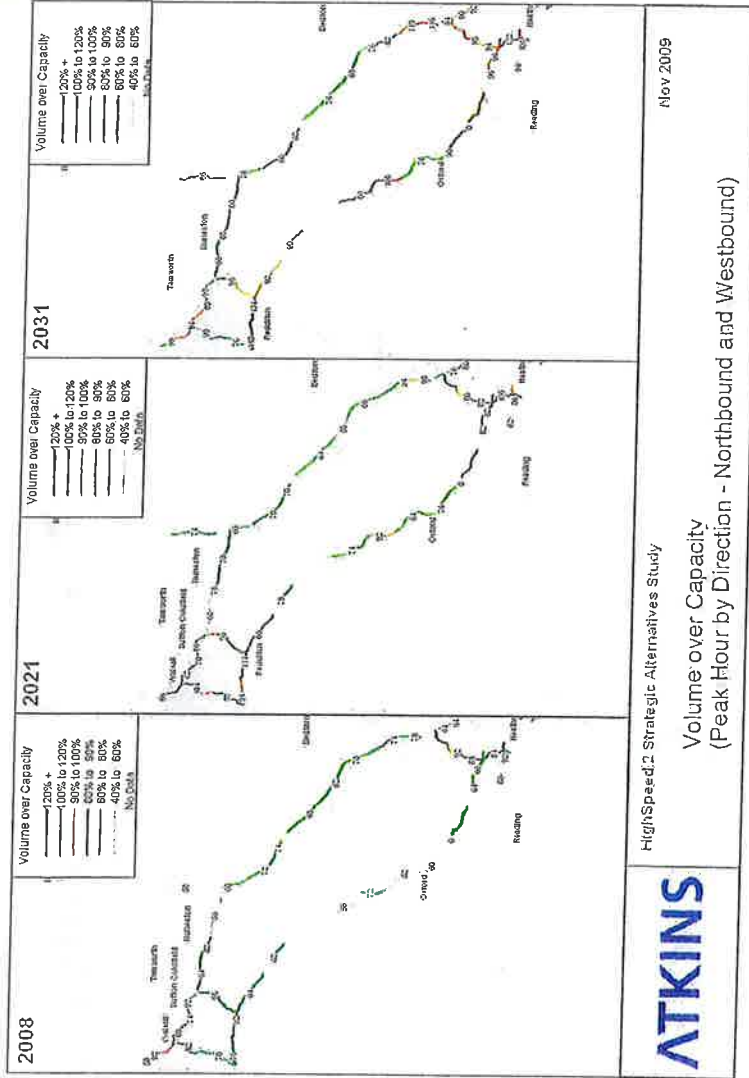
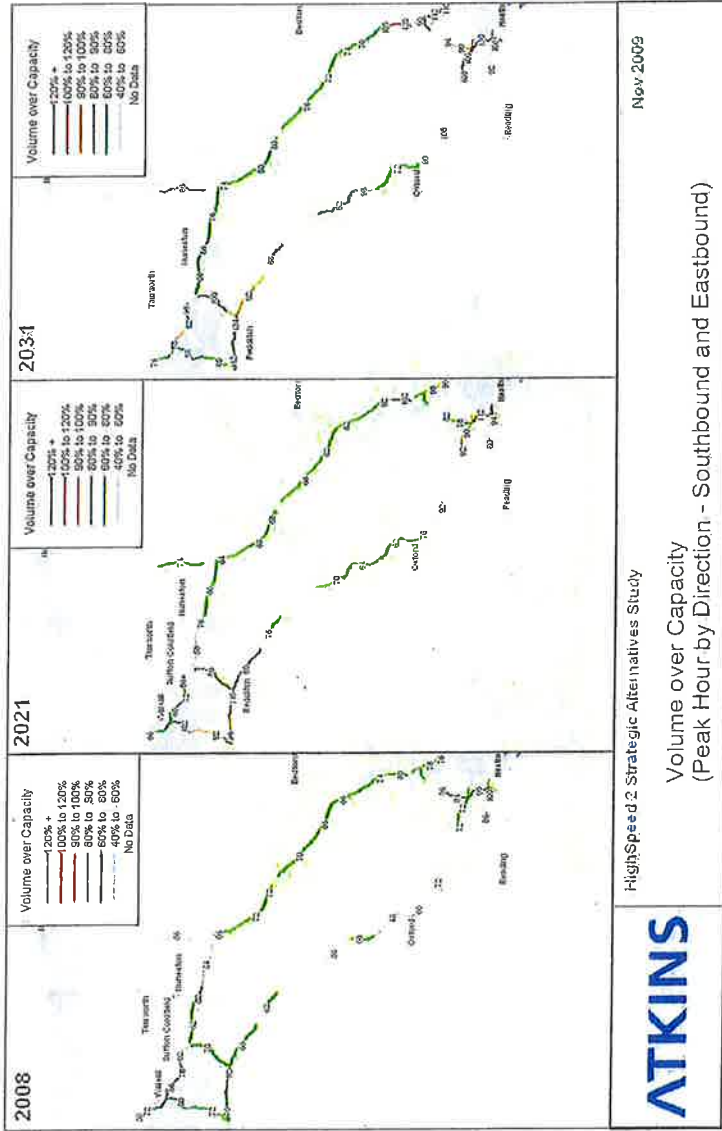


Figure 2.8 - Forecast Peak Hour Two-Way Volume over Capacity SB and EB Directions



3. Road Improvement Proposals

3.1 Introduction

In this section potential interventions are examined. These interventions are guided by estimates of the Volume/Capacity (V/C) Ratios, based on the analysis described in Chapter 2. This analysis has then been supplemented by discussions with the Highways Agency. Following the analysis a list of potential future interventions is then given.

3.2 Establishing the intervention level

There are no definitive rules within the Highways Agency for establishing when an intervention is necessary. In determining intervention levels for this study, therefore, analysis has been undertaken as to why existing proposed schemes have been taken forward for improvement. This analysis has considered the forecast volume over capacity ratios which would be reached before interventions are undertaken as part of:

- The Do Minimum 2021 Network for this study; and
- The Highways Agency Hard Shoulder Running Review.

3.2.1 The 2021 Do-Minimum Road Network

Analysis has been undertaken of the Hard Shoulder Running schemes identified as part of the 2021 Do Minimum network. This analysis uses 2008 observed flows, factored to the predicted scheme opening year, to calculate volume over capacity figures for an annual average 16 hour period, and for an annual average peak hour.

The analysis uses an opening year capacity which excludes any scheme widening or use of hard shoulder running. Therefore, it calculates a 'worst case scenario' volume over capacity figure prior to the introduction of the particular scheme intervention.

It should also be noted that the scheme opening year, as shown in Table 3.1, has been derived by adding two years to the expected work start date. This analysis assumes that all schemes will take approximately two years to construct.

The schemes extracted from the list of 2021 Do Minimum Road Schemes, used in this analysis, are shown in Table 3.1 below.

Table 3.1 – Road Scheme V/C at Opening Year without Intervention

Scheme Description	Direction	Opening Year	RTF 08 Growth	Average Hour V/C	Peak Hour V/C
Hard Shoulder Running M6 J2-4	NB	2018	1.207	66.4%	88.3%
	SB	2018	1.207	65.2%	86.1%
Hard Shoulder Running M6 J5-8	NB	2012	1.067	70.8%	89.0%
	SB	2012	1.067	67.6%	87.2%
Hard Shoulder Running M6 J8-10a	NB	2012	1.067	79.8%	97.6%
	SB	2012	1.067	73.8%	85.4%
M25 Widening J16-23	Clockwise	2012	1.067	78.4%	96.7%
	Anti-clockwise	2012	1.067	71.0%	87.1%
Hard Shoulder Running M4 J3-12	EB	2013	1.096	77.8%	101.6%
	WB	2013	1.096	73.2%	95.0%
Average Peak Hour V/C					91.4%

3.2.2 Highways Agency Hard Shoulder Running Review

During late 2007 and early 2008 the Highways Agency undertook a review to establish locations on the network where hard shoulder running would be beneficial. The results from this review were used as the basis for the work that eventually determined the current Managed Motorways programme, as announced in January 2009. The review lists sites where the thresholds for managed motorways interventions are reached by 2014 and by 2019. This list has been used as a check for the intervention level for this study.

Links in the study area identified as reaching the thresholds for managed motorways either in 2014 or 2019 (but not both years) have been identified, and considered separately for the purposes of this analysis from those not requiring hard shoulder running. The traffic volumes for each set of links have been analysed. As noted in Section 2 above traffic volumes have been taken from TRADS for the year 2008, and have been factored to the future year using the Road Transport Forecasts 2008 (RTF 08).

Tables 3.2 and 3.3 below show the Peak Hour V/C and the 16 hour V/C in ten percentile bands for sites identified as having, or not having, reached the managed motorway threshold:

Table 3.2 -- Peak Hour V/C with and without MM Threshold

Percentile	Peak Hour V/C			
	Sites with HSR Threshold Reached		Sites without HSR Threshold Reached	
	2014	2019	2014	2019
10%	71.9%	79.8%	49.9%	46.4%
20%	76.6%	80.7%	58.0%	59.6%
30%	80.3%	82.0%	64.5%	68.7%
40%	81.6%	82.7%	68.7%	71.6%
50%	83.6%	88.9%	72.3%	75.3%
60%	91.7%	89.1%	74.8%	78.9%
70%	95.0%	98.2%	81.5%	85.4%
80%	97.7%	99.3%	84.1%	89.7%
90%	102.7%	100.7%	87.3%	93.0%

Table 3.3 – 16 Hour Average V/C with and without MM Threshold

Percentile	16 Hour Average V/C			
	Sites with HSR Threshold Reached		Sites without HSR Threshold Reached	
	2014	2019	2014	2019
10%	55.5%	62.1%	32.7%	29.3%
20%	58.9%	63.6%	37.9%	39.7%
30%	62.1%	63.7%	46.5%	49.0%
40%	63.8%	63.8%	48.0%	51.5%
50%	65.7%	64.6%	50.5%	53.2%
60%	69.9%	64.7%	52.4%	54.7%
70%	72.9%	65.4%	54.9%	56.5%
80%	76.9%	65.7%	57.7%	58.4%
90%	79.2%	81.0%	61.1%	61.7%

3.2.3 Summary

The key points to note from Table 3.1 are:

- All peak hour volume over capacity figures are above 85%, averaging over 91%;
- Four of the schemes show a peak hour volume over capacity figure of over 90%;
- On the M4 between junction 3 and 12, peak hour volume over capacity is over 100% and

- It could be concluded that if a scheme has a peak hour volume over capacity percentage of over 91%, it is probable that it would be taken forward for improvement.

The key points to note from Tables 3.2 and 3.3 are:

- Over 90% of sites that had not achieved the HA's HSR threshold for hard shoulder running have a peak hour V/C below 87% in 2014, and below 93% in 2019. This suggests the threshold set by the HA corresponds to a V/C ratio at or exceeding 90%.
- The corresponding figures for the 16-hour average V/C are 61% in 2014 and 62% in 2019.
- The 50%ile peak hour V/C for sites for sites having reached threshold is 84% in 2014 and 89% in 2019.
- The 50%ile 16 hour average V/C for sites having reached the managed motorway threshold is 66% in 2014 and 65% in 2019.

Therefore it is concluded that intervention levels of 90% for peak hour V/C would seem appropriate points as the basis for identifying when interventions would be necessary for the purposes of this study.

3.3 Consultations

Discussions were held with the Highways Agency to establish potential issues and constraints along the motorway network within the study area. The following points were raised with respect to each of the route sections.

3.3.1 M1 junctions 10-18

- This section is one of the recently identified Managed Motorway schemes. Previous schemes to widen between M1 J10-13 have been removed from the Roads Programme
- Further interventions on M1 J10-13 could require land to be purchased. This is particularly significant in the urban area near J11 where the motorway is in a retained cutting to minimise impacts; and
- There will be environmental impacts of widening across the river viaducts and floodplain south of J16

3.3.2 M1 junction 19/M6/A14 interchange

- The proposed improvement scheme provides free flow movements between M6 and M1 south only. M6 to M1 North movements will be via a new roundabout;
- The proposals were moved north to avoid River Avon viaducts and associated floodplain to reduce structural (widening structure and/or strengthening of parapets) and environmental issues; and
- The proposed improvement scheme, whilst not including specific measures to facilitate future implementation of HSR, would not constrain its implementation (i.e. standard carriageway cross-sections provided including hard shoulders).

3.3.3 Birmingham Box

- The environmental impact and costs are such that it is unlikely to be considered feasible to widen the elevated sections of the M6 through Birmingham. Moreover, the M6 Toll provides parallel capacity to this section of the route. For these reasons, for the purposes of this strategic analysis, M6 J4-11 has been constrained to D3+HSR, although forecast demand would suggest the provision of higher capacity.

3.3.4 M40 junctions 1-10

- There are currently **no issues** with lane capacity on **these** sections. Generally, M40 is a rural alignment and therefore **widening** could be **accommodated**; and
- **Major issues** are **junction capacities**; in particular J4, J9 & J10. J4 was **recently improved** (A404 to M40 north free flow added) and J9 & J10 improvements are **being investigated**.

3.4 Possible Interventions

3.4.1 Introduction

Appendix A includes schedules of V/C ratios with/without interventions. These are colour coded for ease of reference, as follows:

- V/C ratios 75-85% shaded green
- V/C ratios 85-90% shaded orange
- V/C ratios 90-100% shaded yellow
- V/C ratios over 100% shaded red
- Potential sections of increased capacity shaded yellow

The engineering aspects of the potential interventions are discussed below in the remainder of this section.

3.4.2 M25 Heathrow Spur

The existing section is D4M. No improvements planned.

No TRADs data available.

The potential constraints/showstoppers would be:-

- Access to/from airport
- Capacities of junctions

3.4.3 M25 junctions 14 to 16

Existing section is D4M. No improvements planned.

Average hour V/C ratios are 87% in 2021 and 103% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 80%.

The peak hour V/C rises to 112% in 2021 and 129% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the V/C to 90% in 2021 and 103% in 2031. Intervention (by conversion from D4M to D5M+HSR) would reduce the V/C to 75% in 2021 and 86% in 2031.

The potential constraints/showstoppers would be:-

- Hard shoulder discontinuities at J14
- Capacities of junctions

3.4.4 M25 junctions 16 to 21

Existing section is being widened by 2012 to D4M (albeit with hard shoulder discontinuities to enable construction within existing boundaries). No improvements planned.

Average hour V/C ratios are less than 80% even in 2031. No interventions required.

The peak hour V/C rises to 81% in 2021 and 93% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 86%.

The potential constraints/showstoppers would be:-

- Hard shoulder discontinuity
- Gade Valley viaduct
- Capacities of junctions

3.4.5 M1 junctions 1 to 6A

Existing section is to D3M. No improvements planned.

Average hour V/C ratios are less than 65% even in 2031. No interventions required.

The peak hour V/C rises to 97% in 2021 and 112% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 84%.

The potential constraints/showstoppers would be:-

- Hard shoulder discontinuity at Bunns Lane
- Access to London Gateway
- Capacities of junctions

3.4.6 M1 junctions 6A to 10

This section has recently been upgraded and comprises a D4M layout with full hard shoulders

Average hour V/C ratios are less than 85% even in 2031. No interventions required.

The peak hour V/C for J8-9 rises to 102% in 2021 and 119% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 95% (less than 90% for all other sections).

The potential constraints/showstoppers would be:-

- Capacities of junctions

3.4.7 M1 junctions 10 to 19

This section is planned to be improved to D3M + HSR Managed Motorway status before 2021.

Average hour V/C ratios (assuming free flow not managed motorway status) peak at 71% and 83% in 2021 and 2031 respectively. HSR running could be utilised if necessary. No further interventions required.

The peak hour V/C rises to 68% in 2021 and 80% in 2031 based on the planned provision of a Managed Motorway lane addition. . No further interventions required.

3.4.8 M6 junctions 1 to 4 (M1 to M42)

This section is planned to be improved to D3M + HSR Managed Motorway status before 2021.

Average hour V/C ratios (assuming free flow not managed motorway status) peak at 76% and 87% in 2021 and 2031 respectively. HSR running could be utilised if necessary. No further interventions required.

The peak hour V/C rises to 76% in 2021 and 87% in 2031 based on the planned provision of a Managed Motorway lane addition. . No further interventions required.

The potential constraints/showstoppers would be:-

- Access to Corley MSA
- Capacities of junctions

3.4.9 M6 junctions 4 to 10 (M42 to M5)

This section is planned to be improved to D3M + HSR Managed Motorway status before 2021.

Average hour V/C ratios (assuming free flow not managed motorway status) peak at 86% and 94% in 2021 and 2031 respectively. Average hour V/C ratios (assuming managed motorway status) would reduce to 65% and 74% in 2021 and 2031 respectively.

The **peak hour V/C rises to 85% in 2021 and 97% in 2031 based on the planned provision of a Managed Motorway lane addition.** . No further widening interventions are feasible.

The potential constraints/showstoppers would be:-

- Elevated section of motorway

Ideally re-routing of flows on this section is desirable. The most obvious solution is to maximise use of the M6Toll.

3.4.10 M40 junctions 1 to 3

Existing section is D4M. No improvements planned.

Average hour V/C ratios are less than 70% even in 2031. No interventions required.

The **peak hour V/C rises to 92% in 2021 and 107% in 2031. Intervention** (by provision of a Managed Motorway lane addition) would **reduce the 2031 V/C to 86%.**

The potential constraints/showstoppers would be:-

- Capacities of junctions

3.4.11 M40 junctions 3 to 9

Existing section is D3M. No improvements planned.

Average hour V/C ratios are less than 75% even in 2031. No interventions required.

The peak hour V/C rises to 107% in 2031. Intervention (by provision of a Managed Motorway lane addition) would **reduce the 2031 V/C to 80%.**

The potential constraints/showstoppers would be:-

- Capacities of junctions, particularly Junction 4

3.4.12 M40 junctions 9 to 10

Existing section is D3M. No improvements planned, but feasibility study in place to assess need for Junctions 9 and 10.

Average hour V/C ratio rises to 77% in 2031. No interventions required.

The **peak hour V/C rises to 99% in 2031. Intervention** (by provision of a lane addition either D4M or D3M+HSR) would **reduce the 2031 V/C to 74%.**

The potential constraints/showstoppers would be:-

- Access to Cherwell Valley MSA
- Capacities of junctions

3.4.13 M40 junctions 10 to 16

Existing section is D3M. No improvements planned.

Average hour V/C ratios are less than 65% even in 2031. No interventions required.

The peak hour V/C rises to 80% in 2021 and 91% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 69%.

The potential constraints/showstoppers would be:-

- Capacities of junctions

3.4.14 M42 junctions 1 to 3 (M5 to M40)

Existing section is D3M. No improvements planned.

Average hour V/C ratios are less than 80% even in 2031. No interventions required.

The peak hour V/C rises to 106% in 2021 and 123% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2031 V/C to 92%.

The potential constraints/showstoppers would be:-

- Capacities of junction 2.

3.4.15 M42 junctions 3 to 3A (M5 to M40)

Existing section is D3M. No improvements planned.

Average hour V/C ratios are less than 85% even in 2031. No interventions required.

The peak hour V/C rises to 115% in 2021 and 134% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the 2021 V/C to 100%. Intervention (by provision of a two lane additions; i.e. D3M to D4M+HSR) would reduce the 2031 V/C to 80%.

The potential constraints/showstoppers would be:-

- Capacities of junction with M40

3.4.16 M42 junctions 3A to 7 (M40 to M6)

This section is planned to be improved to D3M + HSR Managed Motorway status before 2021.

Average hour V/C ratios are 101% in 2031. Intervention (by provision of a Managed Motorway lane addition) would reduce the VOC to 80%.

The peak hour V/C rises to 94% in 2021 and 109% in 2031. Intervention (by provision of a lane addition) would reduce the 2021 VOC to 87%.

The potential constraints/showstoppers would be:-

- Capacities of junction with M40

3.4.17 M42 junctions 7 to 9 (M6 to M6Toll)

This section is planned to be improved to D3M + HSR Managed Motorway status before 2021.

This section has not been assessed due to lack of traffic data (from the TRADS database)

The potential constraints/showstoppers would be:-

- Capacities of junctions with M6 and M6Toll/M42

3.4.18 M5 junctions 1 to 4 (M6 to M42)

This section is planned to be improved to D3M + HSR Managed Motorway status between 2021 and 2031.

Average hour V/C ratios are less than 80% even in 2031. No interventions required.

The peak hour V/C rises to 102% in 2021 and 88% in 2031. No interventions required.

The potential constraints/showstoppers would be:-

- Capacities of junctions
- Elevated section junctions 1-2

3.4.19 M6Toll (M42 to M6)

This motorway is operated by a private company, Midland Expressway Limited (MEL). It is subject to a DBFO concession due to terminate in 2045 (53 year concession deemed to start 1992 on appointment of DFBO operator). No potential interventions have been examined on this road.

3.5 Summary

Table 3.4 compares the demand interventions and details relevant constraints:-

Table 3.4 - Intervention options determined from traffic demand

Link	Do Minimum (includes planned schemes)	Interventions	Comments
		Demand driven 2031(2021)	
M25 J14-16	D4	D5+HSR (D4+HSR)	Already congested. Land constraints preclude physical improvements
M25 J16-21	D4	D4+HSR	Peak V/C 93%. HSR could not be implemented without major changes to current schemes under construction which contain multiple lengths of hardshoulder/discontinuities
M1 J1-J6a	D3	D3+HSR	Full hardshoulder present except for small discontinuity between J1-2
M1 J6a-10	D4	D4+HSR	D4M opened in 2008, J8-9 Peak V/C 95%. After intervention
M1 J10-19	D3+HSR	No change	HSR may need to be implemented outside peak periods by 2031 (Av hour V/C 86% without HSR).
M6 J1-4	D3+HSR	No change	Peak V/C 91% (J2-3 only), Therefore borderline for improvement. HSR may need to be implemented outside peak periods by 2031
M6 J4-10	D3+HSR	D4+HSR	Already congested. Elevated structure constraints preclude physical improvements.
M40 J1-3	D4	D4+HSR	
M40 J3-9	D3	No change	
M40 J9-10	D3	D3+HSR (D3+HSR)	
M40 J10-16	D3	D3+HSR	
M42 J1-3	D3	D3+HSR (D3+HSR)	
M42 J3-3A	D3	D4+HSR (D3+HSR)	D4+HSR is necessary to reduce Peak V/C from 96%
M42 J3A-7	D3+HSR	D4+HSR	
M5 J1-4	D3+HSR	No change	

4. Road Improvement Packages

4.1 Components of Road Packages

In order to examine the impact of the interventions described in Chapter 3 of this document, a series of four Highway Intervention Packages have been developed. The details and rationale behind the formulation of these packages is summarised in table 4.1.

Table 4.1 - Rationale and components of the proposed intervention packages

	Rationale	Components
Package 1	This is considered the minimum level of intervention that can be provided within existing highway boundaries to maintain traffic flows using Managed Motorway controls.	Hard Shoulder Running (HSR) implemented on all sections excluding M25 Widening M42 J3-7 to D4M+HSR
Package 2	Extends Managed Motorway controls to M25. It is envisaged that these works would extend beyond the highway boundary and therefore land purchase would be required	Package 1 but with further interventions to provide HSR and some widening on the M25
Package 3	Additional capacity would be provided on the M40 corridor to minimise journey time as well as maintain journey time reliability	All interventions as Package 2 except along the M40. The M40 would be widened to a full standard cross section to accommodate peak hour flows
Package 4	This package is to provide the upper limit on interventions. It assumes all motorway links are widened	All HSR sections, except M6 J4-11, widened giving additional capacity on all study area motorways

The detail of the elements of each of the proposed packages are summarised in Table 4.2 below. They are also represented graphically in Figures 4.1 to 4.5 that follow.

Table 4.2 - Comparison of current and proposed motorway standards

				Motorway standards provided					
				KEY to Legends:-					
				D3/D4/D5		Dual 3, 4 or 5 lane motorway			
D3+HSR/D4+HSR		Hard Shoulder used as an additional lane during peak periods							
D3+2/D4+2		Dual 3or 4 lane motorway contiguous with a dedicated 2 lane slip road							
				Network Options in 2031					
				2008 Current network	2008RP	Package 1	Package 2	Package 3	Package 4
Road	Jnc A	Jnc B	Link with Maximum V/C						
BIRMINGHAM TO LONDON									
M1	1	6a	M1 SB 5-6	D3	D3	D3+HSR	D3+HSR	D3+HSR	D4
M1	6a	10	M1 SB 8-9	D4	D4				D5
M1	10	19	M1 SB 15a-16	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4
M40	1	1a	M40 SB 1-1A	D3	D3	D3+HSR	D3+HSR	D4	D4
M40	1a	3	M40 SB 2-3	D4	D4			D5	D5
M40	3	8	M40 SB 5-6	D3	D3	D3+HSR	D3+HSR	D4	D4
M40	8	9	M40 SB 5-6	D3	D3	D3	D3	D4	D4
M40	9	16	M40 SB 9-10	D3	D3	D3+HSR	D3+HSR	D4	D4
M42	1	3	M42 EB 3-3A	D3	D3	D3+HSR	D3+HSR	D3+HSR	D4
M42	3a	7	M42 SB 4-5	D3+HSR	D3+HSR				D5
M5	1	4	M5 SB 1-2	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4
M6	1	2	M6 SB 1-2	D3	D3	D3	D3	D3	D3
M6	2	4	M6 SB 2-3	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4
M6	4	11	M6 SB 4a-5	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR
M25	14	15	M25 AC 14-15	D3+2	D3+2	D3+2			
M25	15	16	M25 AC 15-16	D4	D4	D4			D5
M25	16	21	M25 AC 17-18	D3	D4	D4			D5
M4	3	10	M4 EB 4b-5	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4
M6Toll			M6(T) SB T5-T4	D3	D3	D3	D3	D3	D3

Notes:

1. The schemes to provide hard shoulder running on M5 J1-5 are not currently being taken forward in the National Roads Programme, as announced in January 2009 (Britain's Transport Infrastructure, Motorways and Major Trunk Roads, DfT). However, they are included in this study to provide consistency with the High Speed 2 Do Minimum.
2. Package 4 includes the upgrading of the M4 J3-J10 from D3+HSR to D4, M4 J3-4 serves as a link to Heathrow and M4 J4-9 as a potential alternative route to M40 via A404. But widening of the full length of M4 J4-10 is unlikely to be a strategic consideration in reducing journey time between London and the West Midlands.
3. The inclusion of M5 J1-5 in the reference case and M4 J4-9 in Package 4 is not considered material in the comparison of the strategic alternatives because the net impact is unlikely to change the overall comparative result of the packages. The inclusion of the M5 in the reference case is likely to underestimate the benefits and including the M4 is likely to overestimate the benefits. In either case the effects are likely to be marginal.
4. The environmental impact and costs are such that it is unlikely to be considered feasible to widen the elevated sections of the M6 through Birmingham. Moreover, the M6 Toll provides parallel capacity to this section of the route. For these reasons, for the purposes of this strategic analysis,

M6 J4-11 has been constrained to D3+HSR, although forecast demand would suggest the provision of higher capacity.

Figure 4.1 - Road Network incorporating Roads Programme 2008

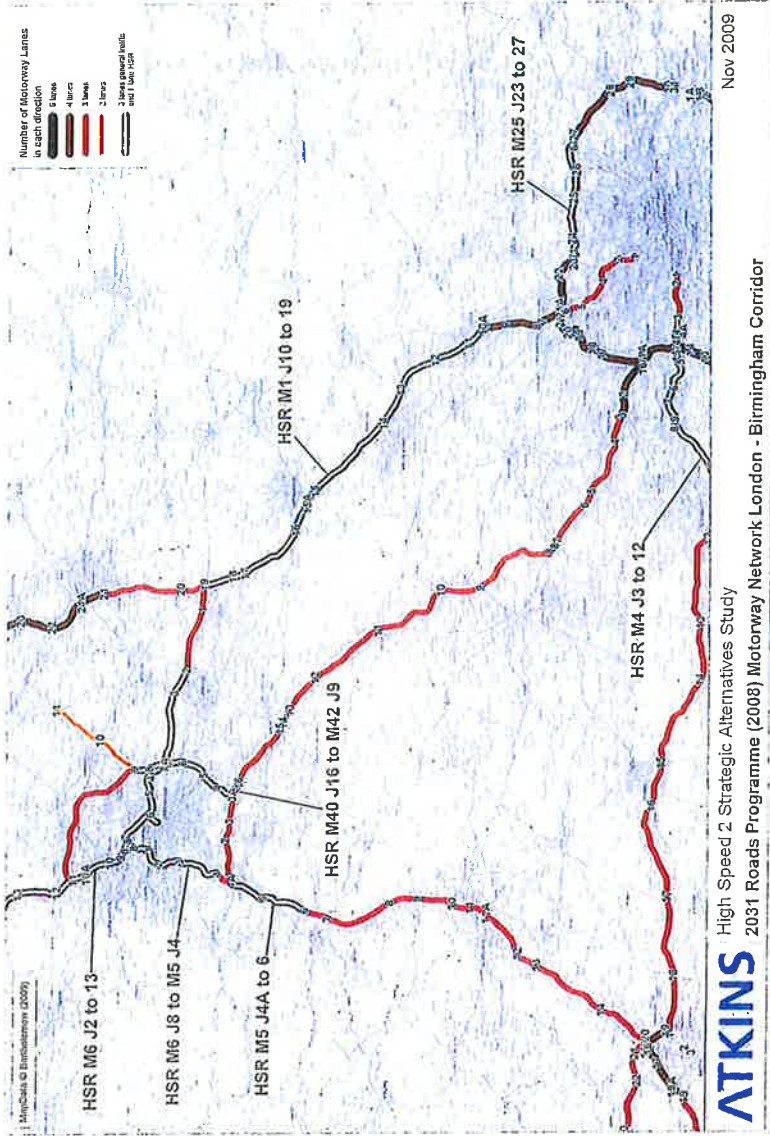


Figure 4.2 - Road Network incorporating Package 1 Proposals

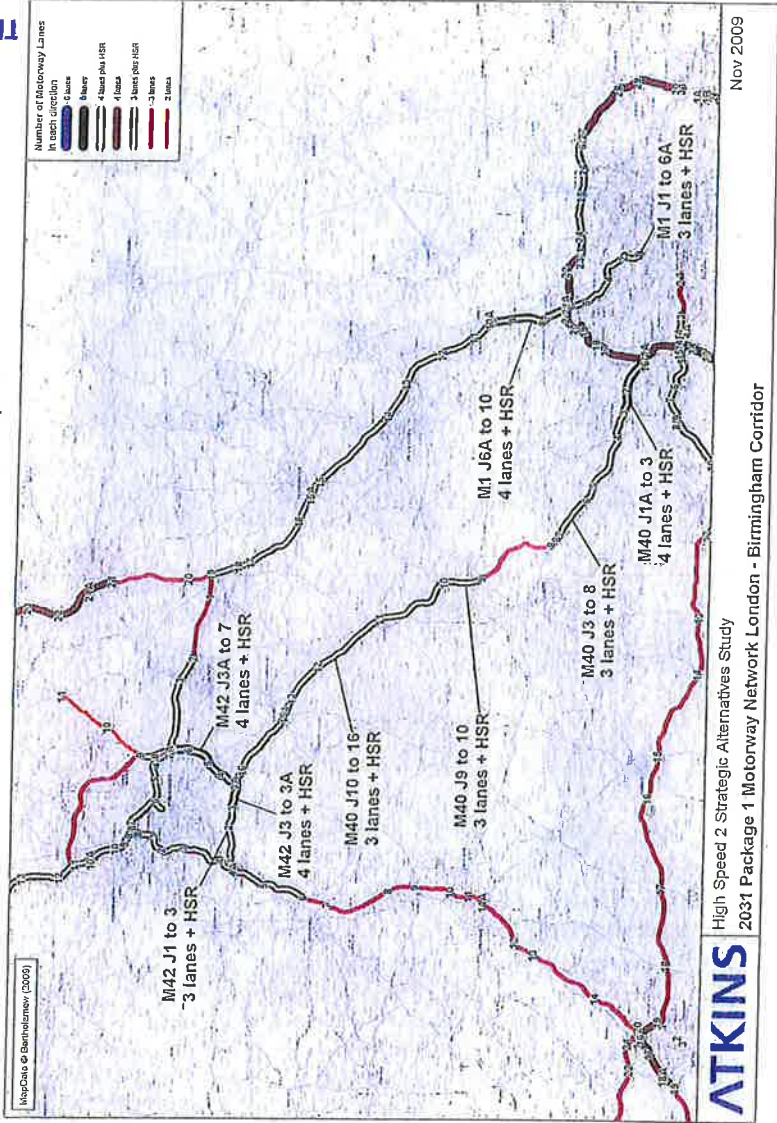


Figure 4.3 – Road Network incorporating Package 2 Proposals

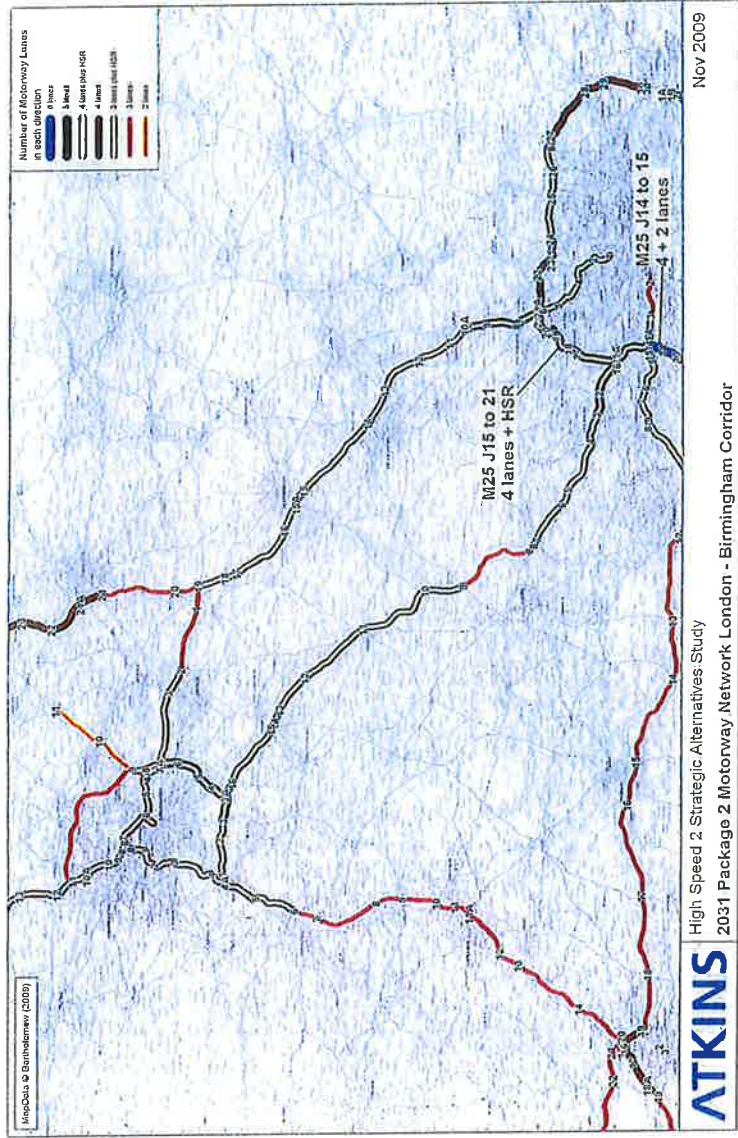




Figure 4.4 - Road Network incorporating Package 3 Proposals

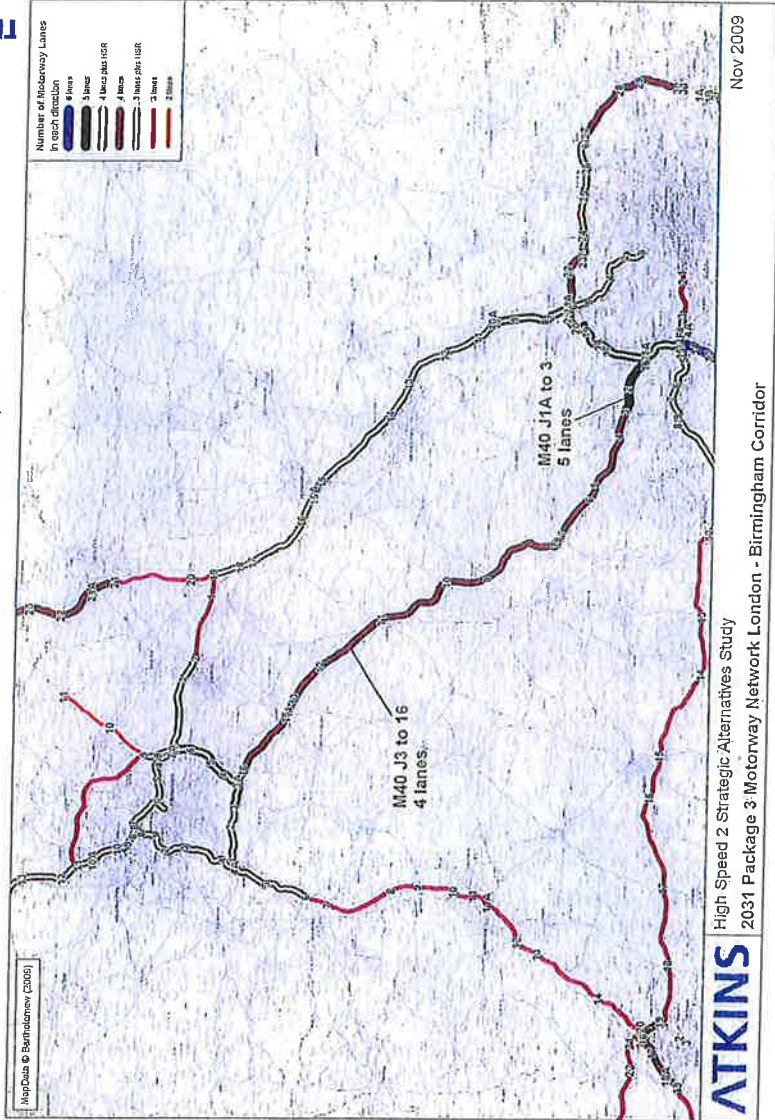
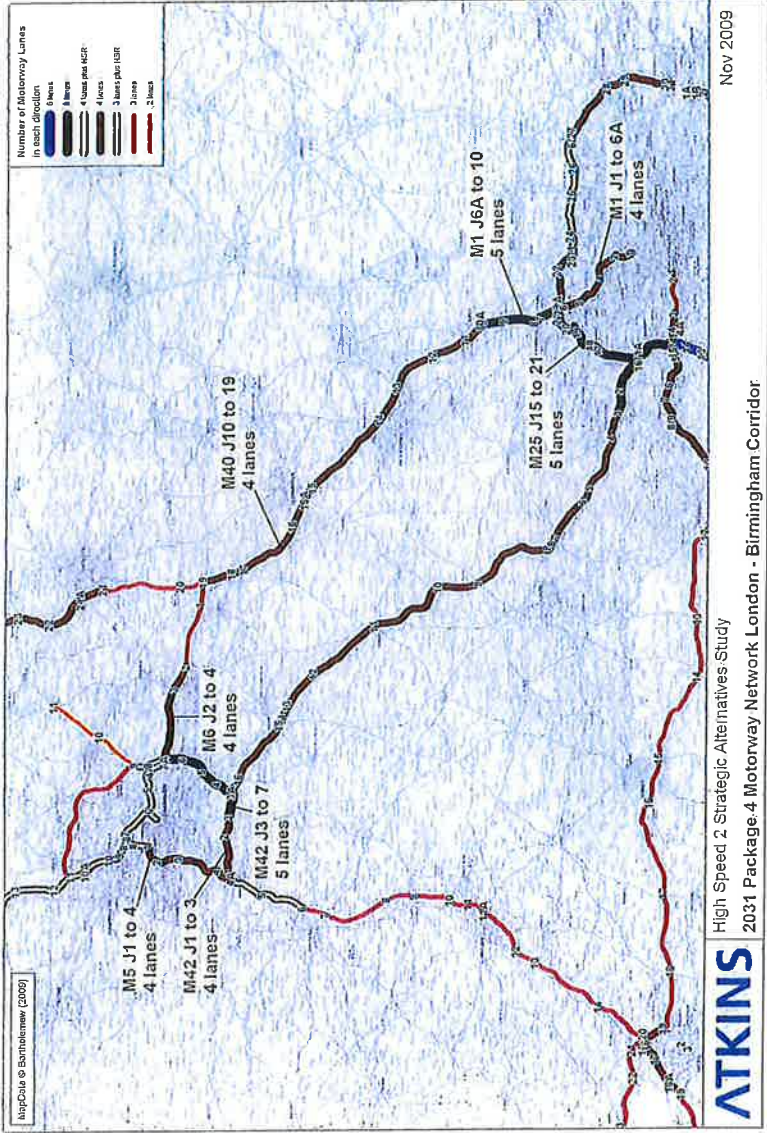


Figure 4.5 – Road Network incorporating Package 4 Proposals



4.2 Additional Assumptions

4.2.1 Hard Shoulder Running schemes (Packages 1 and 2)

In accordance with the criteria adopted for the Highways Agency Managed Motorway projects, the construction packages for the Hard Shoulder Running packages (1 and 2) will comprise:-

- Comprehensive COMMS systems and facilities to incorporate MM control systems
- Minimal carriageway construction, and associated works, to facilitate provision of hard-standings for maintenance vehicles and refuges for breakdowns.
- No improvements to junctions
- No carriageway widening or maintenance works (e.g. paving central reserve and adding concrete barriers)

4.2.2 Widening schemes (All Packages)

Generally the widening schemes are associated with ensuring a high performance (minimising journey times), the construction packages will comprise:-

- Junction Improvements (see Section 4.3)
- Full carriageway widening (i.e. narrow lanes not considered)
- Provision of hard shoulder throughout
- Widening of all structures
- Upgrading of drainage systems to satisfy current pollution and flood control requirements

4.2.3 Junction Improvements

The existing junction layouts are either single bridge or twin bridge layouts. In order to estimate the impacts of the schemes later in the study, typical layouts have been derived from recently completed schemes on the M4 J11 and M40 J4, the construction packages will comprise:-

- Replacing existing bridges and circulatory carriageways with 4 lane roundabouts;
- Full signalisation of the roundabouts;
- Dedicated lanes linking motorway slip roads to adjacent major side roads;
- Local widening of side and slip roads on approaches/exits to the roundabouts; and
- Providing "Tiger Tail" merge / diverge layouts.

4.3 Package Value Engineering

The Package Identification described in this section provides the rationale, and then the detail, of the four Packages taken forward for analysis. At this stage in the study, the Packages comprise of either standard Hard Shoulder Running or Widening schemes. If these schemes were to progress then they would be subject to Value Engineering which may change the detail of some of the schemes. Such items to be examined could include:

- Use of narrow lanes or tidal flow running;
- Use of access control measures, such as the introduction of High Occupancy Vehicle Lanes or low emission lanes;

5. Summary and Conclusions

This report documents the process used to arrive at the identification of a number of highway intervention packages for analysis as strategic alternatives to a high speed rail line between London and the West Midlands. A total of four packages have been identified, with each package incremental to the preceding one.

Traffic demand has been forecast assuming unconstrained growth as determined by applying global factors. The assumption on traffic growth is consistent with that assumed by the HS2 Ltd. study. The forecast demand generally implies the need for an extra lane along each link.

The analysis undertaken is strategic in nature. It assumes that the junctions on the motorway network have sufficient capacity to allow access to the network. Similarly it assumes that the local road network does not limit access. Finally, the effects of weaving on short links have not been considered.

The four packages identified have been determined for economic and environmental assessment, as well as more detailed costing. Cost estimates for HSR schemes will be based on minimal construction works, whilst cost estimates for widening schemes will assume minimal landtake (symmetrical type widening) with junction improvements and major drainage enhancements.

Appendix A

Traffic Assessments

Table A.1 - V/C ratios on existing network without intervention

Road	Dir.	Jnc A	Jnc B	Link with Maximum V/C	2031 Annual Average Hourly Weekday Flow		RP2008 - V/C without HSR (Average Hour)			RP2008 - V/C with HSR (Average Hour)			RP2008 - V/C with HSR (Peak Hour)		
					16 hr average	Peak Hour	2008	2021	2031	2008	2021	2031	2008	2021	2031
BIRMINGHAM TO LONDON															
M1	SB 1	6a		M1 SB 5-6	3806	6709	44.1%	55.0%	63.4%	44.1%	55.0%	63.4%	78%	97%	11%
M1	SB 6a	10		M1 SB 8-9	6704	9523	56.9%	71.7%	83.0%	56.9%	71.7%	83.0%	85%	10%	1%
M1	SB 10	19		M1 SB 15a-16	5000	6397	56.6%	71.3%	83.2%	56.6%	71.3%	83.2%	85%	10%	1%
M40	SB 1	1a		M40 SB 1-1A	4042	6281	46.8%	58.4%	67.4%	46.8%	58.4%	67.4%	73%	86%	10%
M40	SB 1a	3		M40 SB 2-3	5229	8566	45.2%	57.0%	66.6%	45.2%	57.0%	66.6%	73%	86%	10%
M40	SB 3	8		M40 SB 5-6	4320	6438	48.9%	61.6%	72.0%	48.9%	61.6%	72.0%	73%	86%	10%
M40	SB 8	9		M40 SB 8a-9	2940	4309	38.3%	42.0%	49.0%	38.3%	42.0%	49.0%	49.0%	49%	72%
M40	SB 9	16		M40 SB 9-10	4606	5925	52.1%	65.7%	77.6%	52.1%	65.7%	77.6%	67%	85%	10%
M42	EB 1	3		M42 EB 3-3A	4814	8014	55.1%	69.3%	80.2%	55.1%	69.3%	80.2%	85%	10%	1%
M42	SB 3a	7		M42 SB 4-5	5822	8142	67.8%	85.2%	98.7%	67.8%	85.2%	98.7%	86%	10%	1%
M42	SB 7	9		M42 SB 7a-b	4800	6724	54.9%	69.1%	80.0%	54.9%	69.1%	80.0%	77%	73%	84%
M5	SB 1	4		M5 SB 1-2	4700	7056	59.8%	67.6%	78.3%	59.8%	67.6%	78.3%	81%	77%	83%
M6	SB 1	2		M6 SB 1-2	3620	4961	42.4%	52.8%	60.3%	42.4%	52.8%	60.3%	67%	76%	76%
M6	SB 2	4		M6 SB 2-3	5237	6960	61.3%	76.3%	87.3%	61.3%	76.3%	87.3%	82%	85%	97%
M6	SB 4	11		M6 SB 4a-5	5902	7781	68.1%	86.1%	95.4%	68.1%	86.1%	95.4%	85%	97%	97%
M25	AC 14	15		M25 AC 14-15	8681	11406	60.3%	75.3%	85.8%	60.3%	75.3%	85.8%	75%	85%	1%
M25	AC 15	16		M25 AC 15-16	8022	10342	69.6%	87.0%	97.0%	69.6%	87.0%	97.0%	90%	11%	1%
M25	AC 16	21		M25 AC 17-18	6074	7475	70.3%	85.9%	95.9%	70.3%	85.9%	95.9%	81%	93%	93%
M4	EB 3	10		M4 EB 4b-5	6637	8585	55.0%	69.3%	80.2%	55.0%	69.3%	80.2%	66%	84%	10%
M6(T)	SB			M6(T) SB T5-T4	1509	2311	17.3%	21.7%	25.1%	17.3%	21.7%	25.1%	26%	39%	39%

Road	Dir.	Jnc A	Jnc B	Link with Maximum V/C	2031 Annual Average Hourly Weekday Flow		RP2008 - V/C without HSR (Average Hour)			RP2008 - V/C with HSR (Average Hour)			RP2008 - V/C with HSR (Peak Hour)				
					16 hr average Hour	Peak Hour	2008	2021	2031	2008	2021	2031	2008	2021	2031		
CONDON/BIRMINGHAM																	
M1	NB	1	6a	M1 NB 4-5	3550	5535	41.2%	51.5%	59.3%	41.2%	51.5%	59.3%	64%	60%	62%		
M1	NB	6a	10	M1 NB 6-9	6764	9215	57.4%	72.4%	84.9%	57.4%	72.4%	84.9%	73%	73%	73%		
M1	NB	10	19	M1 NB 10-11	5392	7329	60.9%	76.3%	89.7%	60.9%	76.3%	89.7%	63%	63%	63%		
M40	NB	1	1a	M40 NB 1-1A	4288	6165	49.6%	62.0%	71.5%	49.6%	62.0%	71.5%	65%	65%	65%		
M40	NB	1a	3	M40 NB 1A-2	5458	7895	46.3%	55.4%	68.2%	46.3%	55.4%	68.2%	65%	65%	65%		
M40	NB	3	8	M40 NB 4-5	4372	6259	49.4%	62.4%	72.9%	49.4%	62.4%	72.9%	71%	71%	71%		
M40	NB	8	9	M40 NB 8a-9	3023	4525	34.2%	43.1%	50.4%	34.2%	43.1%	50.4%	51%	51%	51%		
M40	NB	9	16	M40 NB 9-10	4750	6426	53.7%	67.8%	79.4%	53.7%	67.8%	79.4%	73%	73%	73%		
M42	NB	3a	7	M42 NB 3-3A	4968	7982	56.6%	71.5%	82.6%	56.6%	71.5%	82.6%	75%	75%	75%		
M42	NB	7	9	M42 NB 6-7	6073	8717	69.5%	87.4%	92.5%	69.5%	87.4%	92.5%	81%	81%	81%		
M42	NB	7	9	M42 NB 7-7a	4469	6775	51.2%	64.3%	74.5%	51.2%	64.3%	74.5%	73%	73%	73%		
M5	NB	1	4	M5 NB 1-2	4652	7293	53.2%	66.9%	77.5%	53.2%	66.9%	77.5%	63%	63%	63%		
M6	NB	1	2	M6 NB 1-2	3752	4634	43.9%	54.7%	62.5%	43.9%	54.7%	62.5%	57%	57%	57%		
M6	NB	2	4	M6 NB 2-3	5366	7054	63.1%	76.5%	88.9%	63.1%	76.5%	88.9%	77%	77%	77%		
M6	NB	4	11	M6 NB 10-10a	6004	7839	70.3%	87.6%	91.2%	70.3%	87.6%	91.2%	83%	83%	83%		
M25	CW	14	15	M25 CW 14-15	8117	10184	56.4%	70.4%	80.4%	56.4%	70.4%	80.4%	71%	71%	71%		
M25	CW	15	16	M25 CW 15-16	8256	9737	74.7%	87.5%	91.7%	74.7%	87.5%	91.7%	86%	86%	86%		
M25	CW	16	21	M25 CW 18-19	6937	8688	60.9%	75.2%	86.7%	60.9%	75.2%	86.7%	75%	75%	75%		
M4	WB	3	10	M4 WB 4-4b	6567	8699	78.6%	93.1%	95.1%	78.6%	93.1%	95.1%	83%	83%	83%		
MetOJ	NB			M6(T) NB 14-T5	1568	2306	17.6%	22.6%	26.1%	17.6%	22.6%	26.1%	33%	33%	33%		

Table A.2 - Interventions (highlighted in yellow) to achieve VOC ratios of 90% or less

Road	Dir.	Jnc A	Jnc B	Link with Maximum VIC	2031 Annual Average Hourly Weekday Flow		RP2009 – VIC with HSR (Peak Hour)	Package 1 – VIC with HSR (Peak Hour)		Package 2 – VIC with HSR (Peak Hour)		Package 3 – VIC with HSR (Peak Hour)		Package 4 – VIC with HSR (Peak Hour)			
					16 hr average	Peak Hour		Layout	V/C	Layout	V/C	Layout	V/C	Layout	V/C	Layout	V/C
BIRMINGHAM TO DON																	
M1	SB	1	6a	M1 SB 5-6	3806	6709	D3	D3+HSR	32%	D3+HSR	37%	D3+HSR	39%	D3+HSR	39%		
M1	SB	6a	10	M1 SB 8-9	6704	9523	D4	D4+HSR	56%	D4+HSR	65%	D4+HSR	65%	D4	65%		
M1	SB	10	19	M1 SB 15a-16	5000	6397	D3+HSR	D3+HSR	80%	D3+HSR	80%	D3+HSR	85%	D4	85%		
M40	SB	1	1a	M40 SB 1-1A	4042	6281	D3	D3+HSR	79%	D3+HSR	79%	D4	79%	D4	79%		
M40	SB	1a	3	M40 SB 2-3	5329	8566	D4	D4+HSR	85%	D4+HSR	85%	D5	86%	D5	86%		
M40	SB	3	8	M40 SB 5-6	4320	6438	D3	D3+HSR	82%	D3+HSR	81%	D4	81%	D4	81%		
M40	SB	8	9	M40 SB 8a-9	2940	4309	D3	D3	72%	D3	72%	D4	74%	D4	74%		
M40	SB	9	16	M40 SB 9-10	4606	5925	D3	D3+HSR	74%	D3+HSR	74%	D4	74%	D4	74%		
M42	EB	1	3	M42 EB 3-3A	4814	8014	D3	D3+HSR	92%	D3+HSR	92%	D3+HSR	92%	D4	92%		
M42	SB	3a	7	M42 SB 4-5	5922	8142	D3+HSR	D4+HSR	81%	D4+HSR	81%	D4+HSR	85%	D5	85%		
M42	SB	7	9	M42 SB 7a-8	4800	6724	D3+HSR	D3+HSR	84%	D3+HSR	84%	D3+HSR	85%	D4	85%		
M5	SB	1	4	M5 SB 1-2	4700	7056	D3+HSR	D3+HSR	88%	D3+HSR	88%	D3+HSR	88%	D4	88%		
M6	SB	1	2	M6 SB 1-2	3620	4561	D3	D5	76%	D3	76%	D3	76%	D3	76%		
M6	SB	2	4	M6 SB 2-3	5237	6960	D3+HSR	D3+HSR	87%	D3+HSR	87%	D3+HSR	87%	D4	87%		
M6	SB	4	11	M6 SB 4a-5	5902	7781	D3+HSR	D3+HSR	80%	D3+HSR	80%	D3+HSR	87%	D3+HSR	87%		
M25	AC	14	15	M25 AC 14-15	8681	11406	D3-2	D3-2	11%	D3-2	11%	D4+2	35%	D4+2	35%		
M25	AC	15	16	M25 AC 15-16	8022	10342	D4	D4	2%	D4	2%	D4+HSR	75%	D5	75%		
M25	AC	16	21	M25 AC 17-18	6074	7475	D4	D4	30%	D4	30%	D4+HSR	75%	D5	75%		
M4	EB	3	10	M4 EB 4b-5	6637	8565	D3+HSR	D3+HSR	81%	D3+HSR	81%	D3+HSR	85%	D4	85%		
M6Toll	SB			M6(T) SB 15-14	1509	2311	D3	D3	39%	D3	39%	D3	39%	D3	39%		



Road	Dir.	Jnc A	Jnc B	Link with Maximum V/C	2031 Annual Average Hourly Weekday Flow		RP2008 - V/C with HSR (Peak Hour)		Package 1 - V/C with HSR (Peak Hour)		Package 2 - V/C with HSR (Peak Hour)		Package 3 - V/C with HSR (Peak Hour)		Package 4 - V/C with HSR (Peak Hour)	
					16 hr average	Peak Hour	Layout	V/C	Layout	V/C	Layout	V/C	Layout	V/C	Layout	V/C
LONDON TO BIRMINGHAM																
M1	NB	1	6a	M1 NB 4-5	3560	5535	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	69%
M1	NB	6a	10	M1 NB 6-9	6764	9215	D4	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D5	69%
M40	NB	10	19	M40 NB 10-11	5392	7329	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	69%
M40	NB	1	1a	M40 NB 1-1A	4288	6165	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	77%
M40	NB	1a	3	M40 NB 1A-2	5458	7685	D4	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D4+HSR	D5	77%
M40	NB	3	8	M40 NB 4-5	4372	6299	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	77%
M40	NB	8	9	M40 NB 8a-9	3023	4525	D3	D3	D3	D3	D3	D3	D3	D3	D4	77%
M40	NB	9	16	M40 NB 9-10	4750	6426	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	57%
M42	WB	1	3	M42 WB 3-3A	4968	7982	D3	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	60%
M42	NB	3a	7	M42 NB 6-7	6073	8717	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	52%
M42	NB	7	9	M42 NB 7-7a	4469	6775	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	87%
M5	NB	1	4	M5 NB 1-2	4652	7233	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	85%
M6	NB	1	2	M6 NB 1-2	3762	4834	D3	D3	D3	D3	D3	D3	D3	D3	D4	85%
M6	NB	2	4	M6 NB 2-3	5366	7054	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3	81%
M6	NB	4	11	M6 NB 10-10a	6004	7639	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	85%
M25	CW	14	15	M25 CW 14-15	8117	10184	D3+2	D3+2	D3+2	D3+2	D3+2	D3+2	D3+2	D3+2	D4	85%
M25	CW	15	16	M25 CW 15-16	8256	9737	D4	D4	D4	D4	D4	D4	D4	D4	D5	85%
M25	CW	16	21	M25 CW 18-19	6937	8588	D4	D4	D4	D4	D4	D4	D4	D4	D5	85%
M4	WB	3	10	M4 WB 4-4b	5657	8699	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D3+HSR	D4	85%
M6Toll	NB			M6(T) NB 7a-7b	1566	2308	D3	D3	D3	D3	D3	D3	D3	D3	D3	48%
				T5			D3	D3	D3	D3	D3	D3	D3	D3	D3	48%

