HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

# M25 Managed Motorways

# Consultation Document

September 2012

M25 Junctions 5 to 7

An executive agency of the Department for Transport

## *Summary of the Consultation*

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| **Topic of this consultation:** | The regulations for the provision of Variable Mandatory Speed Limits between junctions 5 to 7 of the M25 motorway. |
| **Scope of this consultation:** | We are keen to have your comments on the draft Regulations for providing Variable Mandatory Speed Limits for the M25 managed motorway scheme between junctions 5 and 7; specifically on how the Regulations could affect your organisation or those you represent. The Regulations also introduce the concept of the Emergency Refuge Area. A copy of the draft Regulations is enclosed with this consultation paper. |
| **Geographical scope:** | The proposed managed motorway scheme will enable proactive management the M25 carriageway and intersecting routes between junctions 5 (A21 and M26) and 7 (M23) on this major motorway link around London. |
| **Impact Assessment:** | The Impact Assessment can be found at Appendix A. The Impact Assessment provides analysis of the costs and benefits of the scheme. |

## General Information

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| **To:** | The consultation is aimed at any affected stakeholder groups or individuals. |
| **Body/bodies responsible for the consultation:** | The Highways Agency. |
| **Duration:** | The consultation will last for a period of 6 weeks commencing on 24 September 2012. The consultation will close on 5 November 2012. Please ensure responses arrive no later than that date. |
| **Enquiries:** | John Martin<br>Project Manager<br>Highways Agency<br>Federated House<br>London Road<br>Dorking<br>RH4 1SZ |

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| | Tel: +44 (0) 1306 878 129 \| Fax: + 44 (0)1306 878 366<br><br>M25Junction5to7MM@highways.gsi.gov.uk |

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| **How to respond:** | Please send your consultation response using the Consultation response form in Appendix B to:<br><br>John Martin<br>Project Manager<br>Highways Agency<br>Federated House<br>London Road<br>Dorking<br>RH4 1SZ<br><br>Or alternatively you can respond to the consultation by email:<br><br>M25Junction5to7MM@highways.gsi.gov.uk<br><br>When responding, please state whether you are responding as an individual or representing the views of an organisation. If responding on behalf of a larger organisation please make it clear who the organisation represents, and where applicable, how the views of members were gathered. |
| **Additional ways to become involved:** | The Highways Agency website will include a copy of this consultation pack which will be available to the general public. The website address is:<br><br>http://www.highways.gov.uk/consultations |
| **After the consultation:** | All responses received from consultees within the consultation period will be considered and responded to as necessary. Following the consultation a summary report will be made available on the Highways Agency website. The summary report will provide an analysis of responses received and the Highways Agency response.<br><br>Subject to the results of the consultation; we envisage that the managed motorways scheme will be operational by 2015. |

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| **Compliance with the Government's Consultation Principles:** | This consultation complies with the Government's Consultation Principles. |

## Background

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| **Getting to this stage:** | The M25 managed motorway scheme (M25MM) between junctions 5-7 was included in the review of motorway links identified in the "Advanced Motorway Signalling and Traffic Management Feasibility Study" as a potential priority for managed motorways. The scheme was included in the National Roads Programme announced in January 2009.<br><br>In the October 2010 Spending Review, the Chancellor announced that the M25 J5 to 6/7 managed motorway scheme would be prepared for start of construction before 2015.<br><br>On 12 April 2011 the Secretary of State announced that subject to the completion of statutory processes, construction of the M25 Junction 5 to 7 managed motorway scheme would start in the 2013/14 financial year. |

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**Appendix B – Consultation response Form**

**Appendix C – List of Consultees**

**Appendix D – Q&A for M25 Junctions 5-7**

## *Executive Summary*

Secondary legislation in the form of Regulations made under section 17 of the Road Traffic Regulation Act 1984 is required to implement the Variable Mandatory Speed Limits. This consultation provides an opportunity for interested parties to comment on draft Regulations for introducing Variable Mandatory Speed Limits on the M25 motorway between junctions 5 to 7 managed motorways scheme ("the M25MM Scheme"). The Regulations also introduce the concept of the Emergency Refuge Area.

The M25MM Variable Mandatory Speed Limits will, if approved, be set in response to the prevailing traffic conditions and will be clearly displayed on signs located on gantry mounted Advanced Motorway Indicators above each lane of the main carriageway, on verge mounted Variable Message Signs and on post mounted Advanced Motorway Indicators. Once in force, the Regulations will restrict driving at a speed exceeding that displayed on the signs. When no speed is displayed on the signs then the national speed limit will be in force.

This consultation exercise is concentrated on the proposed Regulations that are needed in order to implement the Variable Mandatory Speed Limits required to operate the M25MM scheme and introduce the concept of the Emergency Refuge Area. We would welcome comments specifically on how the draft Regulations could affect your organisation or those you represent. Consultees are also invited to offer views on the treatment of costs and benefits in the accompanying Impact Assessment, contained in Appendix A.

### Benefits of Managed Motorways

The Highways Agency is committed to building upon the success of the existing managed motorways schemes which have been implemented at a number of busy motorway sections across the country. It is expected that the managed motorways scheme (including conversion of the hard shoulder to a running lane and Variable Mandatory Speed Limits) will:

- Increase motorway capacity and reduce congestion;
- Smooth traffic flows;
- Provide more reliable journey times;
- Increase and improve the quality of information for the driver;
- Maintain and, where possible, improve current safety standards.

# *1. HOW ARE WE CONDUCTING THE CONSULTATION?*

## 1.1 WHAT IS THIS CONSULTATION ABOUT?

We are consulting on the proposed draft regulations required to operate Variable Mandatory Speed Limits and introduce the concept of the Emergency Refuge Area within the M25 managed motorways scheme (M25MM scheme).

## 1.2 WHY DO WE NEED THE MANAGED MOTORWAYS SCHEME?

The M25 is a key strategic route within the Highways Agency (HA) network, orbiting London. The section between Junction 5 (J5) and Junction 7 (J7) has a total length of approximately 12.2 miles (19.6km) and regularly features high traffic flows, especially around peak times, with the junctions heavily used by commuter traffic. The resulting congestion increases business costs and reduces mobility.

The M25MM scheme is part of the Highways Agency's programme to add capacity to the existing strategic road network in order to support economic growth and maintain mobility. It is expected that the managed motorways scheme will:

- Increase motorway capacity and reduce congestion;
- Smooth traffic flows;
- Provide more reliable journey times;
- Increase and improve the quality of information for the driver;
- Maintain and, where possible, improve current safety standards.

The use of Variable Mandatory Speed Limits allows the safe conversion of the hard shoulder to a running lane and hence is an essential element in achieving the objectives above. Through the introduction of technology the aim is to make best use of the existing road space.

## 1.3 JOINING THE DEBATE

We would like to encourage any organisations, businesses or individuals affected by the proposed Managed Motorway Scheme to make contact with us and communicate their views.

If you are responding on behalf of an organisation, it would be helpful if you could note this in your reply. Please also indicate the nature of the

organisation, how many individuals' views are included in the response and ways in which these views were gathered.

A response form has been included in Appendix B and a list of the consultees is contained in Appendix C.

## 1.4 SENDING YOUR CONSULTATION RESPONSE

All responses should be sent in writing (email or by post) to the address below. Please let us have your comments by the 5 November 2012.

John Martin
Project Manager
Highways Agency
Federated House
London Road
Dorking
RH4 1SZ
Tel: +44 (0) 1306 878 129 | Fax: + 44 (0)1306 878 366

Or alternatively to M25Junction5to7MM@highways.gsi.gov.uk

## 1.5 HOW WE WILL ACT ON YOUR RESPONSES

Following the consultation period, we will publish a 'Response to Consultation Report'. This will be published on the Highways Agency website.

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004).

If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Highways Agency.

The Highways Agency will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

## 1.6 FURTHER INFORMATION

To receive further information on the M25MM you can contact the M25 project team in writing at:

John Martin
Project Manager
Highways Agency
Federated House
London Road
Dorking
RH4 1SZ
Tel: +44 (0) 1306 878 129 | Fax: + 44 (0)1306 878 366

Alternatively visit the Highways Agency website at:

http://www.highways.gov.uk/roads/projects/5735.aspx

## 1.7 GOVERNMENT'S CONSULTATION PRINCIPLES

We are conducting this consultation in accordance with the Government's Consultation Principles. The consultation criteria are listed below.

**1) Subjects of consultation -** The objectives of any consultation should be clear and will depend to a great extent on the type of issue and the stage in the policy-making process – from gathering new ideas to testing options.

**2) Timing of consultation** - Engagement should begin early in policy development when the policy is still under consideration and views can genuinely be taken into account.

**3) Making information useful and accessible -** Policy makers should think carefully about who needs to be consulted and ensure the consultation captures the full range of stakeholders affected. Information should be disseminated and presented in a way likely to be accessible and useful to the stakeholders with a substantial interest in the subject matter.

**4) Transparency and feedback -** The objectives of the consultation process should be clear. To avoid creating unrealistic expectations, any aspects of the proposal that have already been finalised and will not be subject to change should be clearly stated.

**5) Practical considerations -** Consultation exercises should not generally be launched during local or national election periods.

If you have reason to believe this consultation document does not comply with these Consultation Principles, please write to our consultation co-ordinator at the address below, setting out the areas where you believe this Paper does not meet the criteria:

Ian Sweeting
Highways Agency,
The Cube,
199 Wharfside Street,
Birmingham, B1 1RN

Or alternatively ian.sweeting@highways.gsi.gov.uk

Further information about the Government's Consultation Principles can be located on the Department for Business Innovation and Skills website:

www://bis.gov.uk/consultations

# *2. LEGISLATIVE CHANGES*

## 2.1 LEGISLATIVE CHANGES FOR THE IMPLEMENTATION OF VARIABLE MANDATORY SPEED LIMITS

Regulations need to be made under section 17(2) and (3) of the Road Traffic Regulation Act 1984 ('the 1984 Act') for the implementation of Variable Mandatory Speed Limits for the M25MM scheme. The proposed Regulations will restrict drivers from driving within the area of the managed motorways scheme at a speed exceeding that displayed on the speed limit signs, or the national speed limit where no other speed limit sign is displayed.

The relevant legislative power in the 1984 Act permits the making of Regulations that regulate the manner in which, and the conditions subject to which, motorways may be used by traffic authorised to use such motorways.

The proposed Regulations will also introduce the concept of the Emergency Refuge Area. The proposed Regulations will therefore modify the Motorways Traffic (England and Wales) Regulations 1982 (S.I. 1982/1163) in relation to the M25MM scheme.

Within the M25MM scheme it will be an offence to use a motorway in contravention of Regulations applying to the scheme made under section 17(2) of the 1984 Act.

Drivers of vehicles that pass a speed limit sign indicating that a speed limit other than the national speed limit applies, should obey that sign until the vehicle passes another sign indicating either that a new speed limit or the national speed limit applies.

Where a speed limit changes less than ten seconds before a vehicle passes the sign, the Regulations allow a driver to proceed at a speed up to the maximum applicable before the change, and to continue to do so until the driver leaves the specified road, the national speed limit applies or until the next speed limit sign. The intention behind this 'ten second' rule is to protect the driver from being prosecuted if, on the approach to a speed limit sign; it changes to a lower speed. For example should a driver approach a speed limit sign and it changes from 60mph to 50mph and he/she is within ten seconds of passing that sign then the driver can legally continue beyond that sign at 60mph until a subsequent speed limit applies or until he/she leaves the specified road. If there was no ten second rule, the issue of safety arises, as the driver would be required to brake sharply in order to comply with the new lower speed limit.

Subject to the outcome of the consultation, the proposed Regulations when made will apply in relation to the M25 between junctions 5 and 7 and to the on-

slip and off-slip roads between junctions 5 and 7. The roads governed by the Regulations will be set out in the Regulations.

The proposed draft Regulations will not apply nationally – they will apply only to those parts of the motorway as specified in the Regulations (namely, the area between and including junctions 5 to 7 of the M25 motorway). As drafted, these Regulations would put in place the legislative framework required to operate the M25MM scheme.

# 3. GENERAL INFORMATION ON THE M25MM SCHEME

## 3.1 PROPOSED EXTENT OF THE M25 MM VARIABLE MANDATORY SPEED LIMITS

A map showing the M25MM scheme is shown in Figure 3A, including the proposed coverage of the scheme. The precise configuration of the extent of the roads that are included within the scheme may be subject to variation. The M25MM scheme will include the motorway and the on-slip and the off-slip roads between junctions 5 and 7 of the M25.

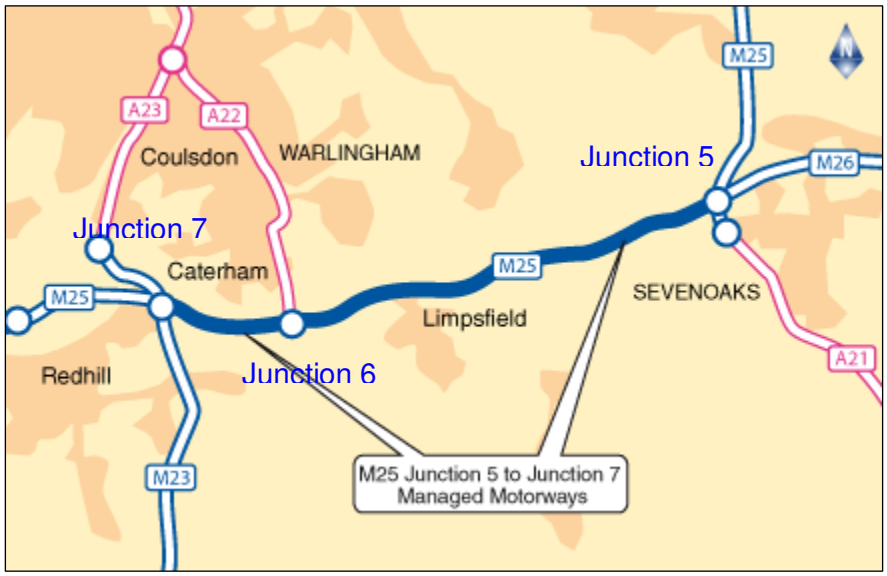


**Figure 3A: M25 Managed Motorways Scheme Map**

## 2.2 KEY FEATURES

Evaluation of the existing managed motorway schemes, demonstrated that managed motorways are able to deliver clear benefits by providing:

- Improved journey time reliability through reduced congestion;
- A scheme at lower cost and with less environmental impact than conventional widening programmes; and
- no negative impact on the safety performance.

The design features of the M25MM scheme include:

- Conversion of the hard shoulder to a permanent running lane;
- Variable Mandatory Speed Limits with an associated enforcement/compliance system;
- Driver information, including lane availability, generally provided at intervals not exceeding 1500m. Information will be provided through a mixture of signs and signals capable of displaying appropriate combinations of: mandatory speed limits; lane closure wickets; pictograms; and text legends, and will also include entry slip signals;
- A queue protection system and congestion management system;
- Comprehensive low light pan-tilt-zoom (PTZ) CCTV coverage;
- Refuge areas generally provided at maximum intervals of 2500m. Refuge areas may either be bespoke facilities (e.g. an emergency refuge area) or alternatively may be converted from an existing facility, for example a wide load bay.
- Emergency Roadside Telephones (ERT) provided in all dedicated refuge areas. Existing ERTs elsewhere will be removed, apart from those within a junction where the existing hard shoulder is retained.

## 3.3 ENFORCEMENT

Obtaining an acceptable level of compliance with the Variable Mandatory Speed Limits (displayed on overhead gantries, verge mounted Variable Message Signs and on post mounted Advanced Motorway Indicators) is key to the successful and safe operation of the M25 Managed Motorway Scheme. No new offences or sanctions will be introduced as a result of the proposed changes to legislation.

Enforcement of Variable Mandatory Speed Limits is planned to be carried out using a combination of gantry-mounted and verge mounted speed enforcement equipment, and traditional enforcement by the Police.

## 4. M25MM SCHEME WITH VARIABLE MANDATORY SPEED LIMITS

To signify that the speed limit is mandatory and enforceable, the speed shown will have a red circle around it, as is the case with all other mandatory speed limit signs.

The operational regimes to be implemented within the MM-ALR scheme are:

- **Normal Operation**;
- **Variable Mandatory Speed Limits**; and
- **Incident Management**

An overview of these operational regimes is provided in Sections 4.1, 4.2 and 4.3.

## 4.1 NORMAL OPERATION

During normal motorway operation the Advanced Motorway Indicators and Variable Message Signs will remain blank and the motorway will operate as shown in Figures 4A and 4B below. When there are no speed limits being displayed the national speed limit will apply.


**Figure 4A: Illustrative M25MM section operating in normal motorway conditions with blank Advanced Motorway Indicators and blank gantry mounted Variable Message Sign**

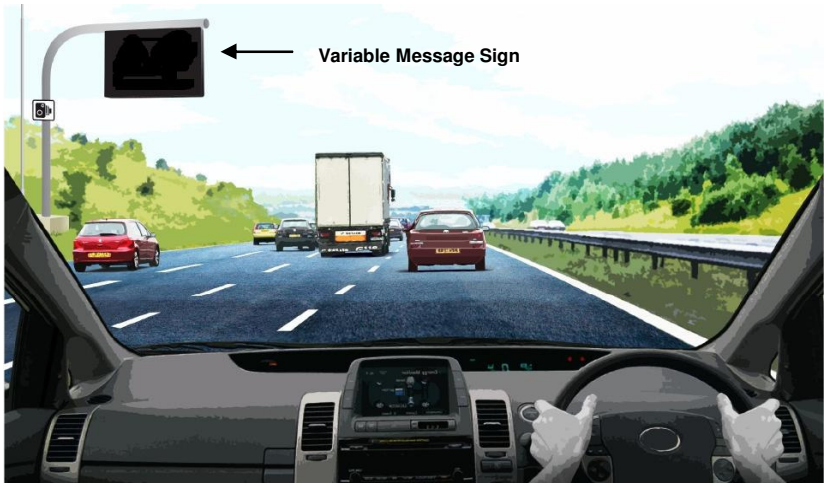


**Figure 4B: Illustrative M25MM section operating in normal motorway conditions with a blank verge mounted Variable Message Sign**

## 4.2 VARIABLE MANDATORY SPEED LIMITS

When variable mandatory speed limits are operational clear instructions will be given to drivers via speed limit signs displayed on post mounted Advanced Motorway Indicator signals, via speed limit signs displayed on the Advanced Motorway Indicator signals above the main carriageway and on the verge mounted Variable Message Signs. This is illustrated in Figure 4C and 4D below. The speed limit displayed will take account of prevailing traffic conditions and will be automatically calculated from sensors buried in the road surface or alternatively set by the Regional Control Centre. The Variable Message Signs located on gantries or on the verge will provide further information for drivers.


**Figure 4C: Illustrative M25MM section operating with Variable Mandatory Speed Limits**


**Figure 4D: Illustrative M25MM section operating with Variable Mandatory Speed Limits and information for road users**

## 4.3 INCIDENT MANAGEMENT

During incident management, the Advanced Motorway Indicators and Variable Message Signs can be set to protect the scene of an incident and assist the access of Emergency Services and other core responders.

On the Advance Motorway Indicators, speed limits and lane availability will be indicated through the use of Variable Mandatory Speed Limits and lane divert arrow signals with flashing amber lanterns and Red X signals with flashing red lanterns as shown in Figure 4E below.

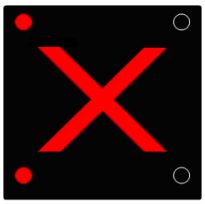

**Figure 4E: Red X (STOP) aspect with flashing red lanterns and a lane divert signal shown on an Advanced Motorway Indicator over any lane**

Appropriate supporting information will be displayed on the Variable Message Signs to further encourage compliant driver behaviour. Modifications to the signal control software will enable a single Variable Message Sign to display three simultaneous elements: in addition to the speed restriction, (as enabled through the Regulations), and supporting text legend, the sign will also be able to display either a warning pictogram (typically a 'red triangle') or lane closure 'wicket' aspect, as indicated in the examples below.

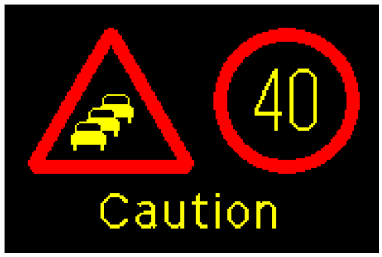


**Figure 4F: Variable Message Sign displaying queue caution information with a reduced mandatory speed limit**


**Figure 4G: Variable Message Sign warning of a closed lane ahead due to an accident**

## 5. APPENDICES

# APPENDIX A – IMPACT ASSESSMENT (IA)

| | |
|---|---|
| **Title:**<br>M25 J5 - 7 Managed Motorway All Lane Running (MM-ALR)<br>**IA No:**<br>**Lead department or agency:**<br>Highways Agency<br>**Other departments or agencies:**<br>None | **Impact Assessment (IA)**<br>**Date:** 1/08/2012<br>**Stage:** Consultation<br>**Source of intervention:** Domestic<br>**Type of measure:** Secondary legislation<br>**Contact for enquiries:** John Martin, Highways Agency, Dorking<br>01306-878129<br>john.martin@highways.gsi.gov.uk |
| **Summary: Intervention and Options** | **RPC Opinion:** RPC Opinion Status |

| Cost of Preferred (or more likely) Option | | | | |
|---|---|---|---|---|
| **Total Net Present Value** | **Business Net Present Value** | **Net cost to business per year** (EANCB on 2009 prices) | **In scope of One-In, One-Out?** | **Measure qualifies as** |
| £582.1m | £502.8 | -£22.6m | Yes | Zero Net Cost |

**What is the problem under consideration? Why is government intervention necessary?**

The M25 between junctions 5 and 7 experiences considerable congestion during peak periods due to a high traffic volume.The congestion reduces the efficiency of movement of people and goods to the detriment of business productivity and the economic and social activities of individuals. If these problems are to be alleviated, then some form of intervention is required. The intervention needs to be undertaken by government since the motorway is owned, operated and maintained by the government through the Highways Agency (HA) and Department for Transport (DfT). The intervention forms part of the DfT's programme of major improvements to the trunk road network.

**What are the policy objectives and the intended effects?**

The objective is to reduce the cost of congestion to business and individuals and thereby encourage economic activity and improve social well being. The intended effects are to reduce journey times and the variability in journey times caused by congestion. In particular, the intention is to reduce congestion on the motorway at all times of day, thereby reducing journey times and making them more predictable or "reliable". There are a number of secondary social and environmental effects which have been quantified and taken into consideration as part of the DfT appraisal process. These are described in the evidence base.

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)**

Existing: The existing situation or "Do Nothing" is a dual three lane motorway (D3M) with a hard shoulder available for emergency use only.
Option 1: The preferred intervention is a system called Managed Motorway (MM) All Lane Running (ALR). MM-ALR is the latest development in MM systems and involves permanent conversion of the hard shoulder to a running lane, together with the introduction of a system called Controlled Motorway (CM). CM involves the use of variable mandatory speed limits (VMSL) of 60, 50 and 40 mph to reduce the incidence of slow moving and queuing traffic. Secondary legislation is required in order to implement ALR and VMSL.
Option 2: The non-preferred intervention is the earlier version of MM (MM1) in which the hard shoulder is opened as a running lane in congested conditions only. MM1 also incorporates CM and VMSL which in turn would also require secondary legislation. MM1 has lower benefits and higher costs than the MM-ALR.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 12/2015

| | | | | | |
|---|---|---|---|---|---|
| Does implementation go beyond minimum EU requirements? | | | N/A | | |
| Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base. | **Micro** Yes | **< 20** Yes | **Small** Yes | **Medium** Yes | **Large** Yes |
| What is the $CO_2$ equivalent change in greenhouse gas emissions? (Million tonnes $CO_2$ equivalent) | | | **Traded:** 0 | **Non-traded:** 3.14 | |

***I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.***

Signed by the responsible SELECT SIGNATORY: ..... Date: .....

HIGHWAYS AGENCY

# Summary: Analysis & Evidence

Policy Option 1

**Description:** M25 J5 - 7 Managed Motorway All Lane Running (MM-ALR)

**FULL ECONOMIC ASSESSMENT**

| Price Base Year 2011 | PV Base Year 2012 | Time Period Years 60 | Net Benefit (Present Value (PV)) (£m) | | |
|---|---|---|---|---|---|
| | | | **Low:** £434.1m | **High:** £738.7m | **Best Estimate:** £582.1m |

| COSTS (£m) | Total Transition (Constant Price) | Years | Average Annual (excl. Transition) (Constant Price) | Total Cost (Present Value) |
|---|---|---|---|---|
| **Low** | n/a | 2 | n/a | **n/a** |
| **High** | n/a | | n/a | **n/a** |
| **Best Estimate** | £456.3m | | £7.7m | **£621.9m** |

**Description and scale of key monetised costs by 'main affected groups'**

Breakdown of BestEstimate "Total Cost" in 2011 market prices, discounted to 2012 Present Value Year.
Govt. (Public Accounts): Installation, Enforcement, Operation, Maintenance and Renewal: £144.7m
Road Users (Economy): Reduction in Transport Economic Efficiency in during Construction: £316.0m
Road Users (Society): Increase in road traffic Noise: £1.0m.
Public (Environment): Increase in Greenhouse Gas Emissions: £160.2m

**Other key non-monetised costs by 'main affected groups'**

Environment: Slight Adverse impacts on Landscape, Townscape, Heritage and Biodiversity.

| BENEFITS (£m) | Total Transition (Constant Price) | Years | Average Annual (excl. Transition) (Constant Price) | Total Benefit (Present Value) |
|---|---|---|---|---|
| **Low** | £0m | 2 | £44.5m | **£1,056.1m** |
| **High** | £0m | | £57.4m | **£1,360.7m** |
| **Best Estimate** | £0m | | £50.6m | **£1,204.0m** |

**Description and scale of key monetised benefits by 'main affected groups'**

Breakdown of Best Estimate "Total Benefit" in 2011 market prices, discounted to 2012 Present Value Year.
Road Users (Economy): Improvement in Transport Economic Efficiency: £636.6m
Road Users (Economy): Improvement in Journey Time Reliability: £383.3m
Public (Environment): Reduction in Accidents: £4.0m
Govt. (Public Accounts): Increase in Indirect Tax Revenue: £180.1m

**Other key non-monetised benefits by 'main affected groups'**

None.

**Key assumptions/sensitivities/risks** — **Discount rate (%)** 3.5/3

The majority of the benefits are based upon the outputs of a traffic model : in particular, the differences between model outputs for the without and with scheme scenarios in the opening year and future years. The estimated benefits are therefore dependent upon the accuracy of the models and future traffic forecasts. To minimise the risk of error in this regard, the traffic models and forecasts have been prepared following DfT guidance. The traffic model meets DfT performance requirements.

**BUSINESS ASSESSMENT (Option 1)**

| Direct impact on business (Equivalent Annual) £m: | | | In scope of OIOO? | Measure qualifies as |
|---|---|---|---|---|
| **Costs:** £0m | **Benefits:** £22.6m | **Net:** -£22.6m | Yes | Zero net cost |

# Evidence Base

## 1. Problem under Consideration

The M25 is the London orbital motorway completed in 1986. The road is of vital importance to economic and social activity in the UK, particularly in the south-east. It is estimated that one million vehicles per day now use the road.

The section of the M25 between Junctions 5-7 lies in the south and connects with the M26 at Junction 5 and the M23 at Junction 7. The road was built as a dual three lane carriageway (D3M) and has become increasingly congested, resulting in queues and delays at peak times and during the inter-peak period. Two-way daily traffic flows range from 126,000 vehicles between Junctions 5 to 6 and 138,000 vehicles between Junctions 6 and 7. These flow levels are at least 40% higher than the Congestion Reference Flow (CRF) of around 90,000 vehicles per day for a D3M carriageway. The CRF represents the daily flow level at which a road is likely to be congested during peak hours. The observed peak hour congestion is consistent with this definition.

## 2. Rationale for Intervention

The current congestion reduces the efficiency of movement of people and goods to the detriment of business productivity and the economic and social activities of individuals. If these problems are to be alleviated, intervention is required. The intervention needs to be undertaken by government since the motorway is owned, operated and maintained by the government through the HA and Department for Transport (DfT). The intervention forms part of the DfT's programme of major trunk road improvements for the 2010-15 spending review period. The programme is delivered by the HA.

## 3. Policy Objective

The DfT's Business Plan 2011-15 sets out a vision for a transport system that is an engine for economic growth and one that is also greener and safer and improves quality of life in our communities. By improving the links that help to move goods and people around, the DfT can help to build the balanced, dynamic and low-carbon economy that is essential for future prosperity.

The primary objective of the DfT's programme of trunk road improvements is to reduce the cost of congestion to business and individuals and thereby encourage economic activity and improve social well being. The improvements seek to achieve this by reducing congestion in order to reduce journey times and improve journey time reliability. In the case of the proposed Managed Motorway scheme, a reduction in congestion is achieved by making the existing hard shoulder available for use as a permanent traffic lane, thereby increasing the traffic carrying capacity of the carriageways and facilitating higher traffic speeds during congested periods.

Although the objective for the scheme is to reduce congestion and improve reliability, there are a number of secondary social and environmental effects which have been quantified and taken into consideration as part of the DfT appraisal process. These are described in the following paragraphs.

# 4. Description of Options

## 4.1 Do Nothing Baseline ie Existing Situation

The Do-Nothing Baseline, or existing situation, is a dual three lane carriageway to motorway standard (D3M). The motorway has post mounted variable message signs located in the central reserve which can be used to set advisory speed limits in the event of downstream queues and other hazards. The signs are set remotely from the control room, but because there are no queue detection loops on the motorway, the signs cannot be set automatically and must be set manually by the control room operator. The system is old technology and has been in place for many years.

## 4.2 Option 1 (Preferred): Managed Motorway All Lane Running

The preferred option is MM-ALR and involves conversion of the existing hard shoulder to a permanent running lane. MM-ALR includes a system known as Controlled Motorway, which also includes a sub system known as MIDAS (Motorway Incident Detection and Automatic Settings).

MIDAS is a system comprising inductive loops buried in the carriageway surface which detect the presence of stationary or slow moving traffic. This information is transmitted to computers which will then provide written warnings and advisory speed limits upstream of the congestion event. Unlike the present manual system, the warnings and advisory speed limits are set automatically via variable message signs which are mounted on cantilevered mast arms above the carriageway. The purpose of the system is to minimise the risk of collisions between fast moving upstream traffic and the slow moving or stationary traffic detected by the loops.

MIDAS is the simplest application of modern motorway control technology. It is solely a safety feature designed to protect queues by providing a warning of their presence to upstream traffic. The next level of control is a system called Controlled Motorway (CM).This system includes MIDAS to protect against queues, but also uses Variable Mandatory Speed Limits (VMSL) to assist in preventing the development of queues. Controlled Motorway is sometimes implemented on existing carriageways as a standalone measure to improve journey time reliability. Alternatively, if the level of congestion is high enough to warrant it, CM can be introduced in conjunction with measures to increase the capacity of the carriageway. In the case of the M25 between J5-7, traffic flow levels are such that there is substantial traffic congestion and an increase in traffic capacity is required.

> The two alternative means of increasing traffic capacity are widening of the carriageway, or introduction of the next and highest level of motorway control technology known as the Managed Motorway (MM) system. Both alternatives include MIDAS and CM technology, the essential difference being that MM relies on use of the hard shoulder rather than physical enlargement to provide additional traffic capacity.
>
> There are now two versions of MM. The first is known as MM1 and involves temporary use of the hard shoulder as a running lane at busy times only. The second and latest version is known as MM-ALR. This is the preferred option and involves permanent rather than temporary use of the hard shoulder as a running lane. It effectively amounts to widening of the carriageway by one lane in each direction, but without any physical works to create an additional lane. The benefits of widening can therefore be achieved with lower costs and this is why widening has not been considered as an option. The choice is between MM1 and MM-ALR.

The operation of the MIDAS component of MM is described above. Like MIDAS, the Controlled Motorway (CM) component of MM uses the same carriageway loops to detect vehicles and also sets speed limits on variable message signs. The difference is that CM also sets speed limits at higher speeds when information on traffic density from the loops indicates that 'bunching' may be occurring. It does not therefore wait until a queue develops. Instead, CM sets variable mandatory speed limits of 60mph and 50mph to reduce bunching and thereby reduce the likelihood of a queue occurring. However, if traffic still becomes slow moving or stationary then, like MIDAS, it will set a 40mph limit. The only difference in these circumstances is that the 40mph limit is a mandatory limit rather than the advisory limit used by MIDAS.

In terms of the operational effects upon traffic flow, the CM system uses VMSL to slow down upstream traffic. This reduces the likelihood of it 'catching up' with a pocket of slower moving traffic and causing traffic density to reach a level at which flow breakdown occurs. Whilst the reduction in speed limit increases journey times upstream of the high density region, these are cancelled out by journey time savings arising from a reduced incidence of flow breakdown and associated queuing. The net effect on average journey times is neutral but the range or variation in journey times is reduced, thereby improving reliability. This is measured in the assessment process by predicting changes in the standard deviation of journey times of trips using the Controlled Motorway as part of their route.

Managed Motorway (MM) takes CM a stage further by reducing congestion and journey times, as well as improving journey time reliability. With MM-ALR, this is achieved by converting the hard shoulder to a permanent running lane. This increases the available road space and thereby reduces the density of traffic (the number of vehicles per unit length of road). This reduced density allows traffic to travel at higher speeds whilst still maintaining a safe headway distance between themselves and the vehicle in front. The higher speeds mean reduced journey times and there is also an increase in the traffic carrying capacity of the road as a result of converting the hard shoulder to a traffic lane.

> In order for the CM element of MM-ALR to be successful, it is essential that the variable speed limits which form part of the CM system are complied with. This requires the speed limits to be mandatory. Secondary legislation is required to allow mandatory variable speed limits to operate. Secondary legislation is also required for conversion of the hard shoulder to a running lane.

It should be noted that the mandatory speed limit signs used as part of a controlled motorway are matrix signs which can display either 40, 50, 60 or the national speed limit sign. Being a mandatory sign, they are required to have a red outer ring in order to comply with the traffic signs regulations. Advisory signs used for MIDAS are also matrix signs, but do not have the red ring. Signs will be mounted above each lane on gantries positioned at the entry to each link, immediately downstream of a slip road or connector road merge. Repeater signs will also be mounted on cantilevered mast arms at regular intervals along the whole scheme section.

Enforcement of VMSL is carried out using a combination of the Highways Agency Digital Enforcement Camera System (HADECS) to automatically monitor compliance, together with traditional enforcement by the Police. Cameras will be mounted on the top of gantries or the cantilevered mast arms where speed limit signs are displayed.

### 4.3 Option 2: Managed Motorway 1 (Temporary All Lane Running)

This option involves allowing the hard shoulder to be used as a running lane on a temporary basis only when traffic flows are sufficiently high to require it. As with the preferred MM-ALR option, MM1 also incorporates MIDAS and CM, with the CM system automatically setting lower speed limits (VMSL) as traffic flows and density reach critical levels. The essential difference compared to MM-ALR is that the hard shoulder can only be opened to traffic by the control room operators initiating the necessary signal sequences on variable message signs. This facility is only enabled when the CM system has reduced the speed limit to 60mph or less. The operator should then close the hard shoulder when the traffic volume has reduced to the extent that speeds on the normal three lanes would be in excess of 60mph. The CM system cannot remove the 60mph limit until the hard shoulder has been closed.

Preliminary cost estimates for the MM1 option indicated that it was approximately 15% more expensive than the preferred MM-ALR option. This is primarily because of the additional signalling required to safely open and close the hard shoulder. With regard to the benefits of MM1, these will inevitably be less than that for MM-ALR. This is because the hard shoulder in MM1 can only be brought into use when flows on the three normal lanes have increased to the extent that a 60mph limit is imposed by the CM system. With MM-ALR however, the same flow levels would be spread across four lanes, producing lower traffic density and higher lane speeds than MM1. These higher speeds would be maintained unless and until traffic flow and density on MM-ALR increases to the point that it is necessary for the CM system to impose a 60mph limit (at which point MM1 and MM-ALR would have the same average speed).

With lower costs and higher benefits than MM1, the preferred option has to be MM-ALR. In fact, it is because MM-ALR has only recently been authorised for use on motorways that MM1 was being considered as an option in the first place. For any new schemes, the HA would not even consider MM1 as it will always cost more and deliver less.

## 5. Details of Costs and Benefits

### 5.1 Do Nothing Baseline ie Existing Situation

The “Do-Nothing” or existing situation represents the baseline against which the proposed MM-ALR scheme is assessed.

### 5.2 Option 1 (Preferred): Managed Motorway 2 (Permanent All Lane Running)

The impacts of the preferred MM-ALR option, including costs and monetised benefits, have been appraised using the DfT’s Web-based Transport Analysis Guidance (WebTAG) which is based upon HM Treasury Green Book principles. WebTAG identifies a wide range of possible impacts that transport schemes can have and prescribes detailed methodologies for quantifying these impacts and monetising them wherever possible. The range of impacts which must be considered come under the three main headings of Economy, Environment and Society which are then subdivided into sub-impacts such as journey times, reliability, noise, air quality, landscape, greenhouse gas emissions and accidents etc. Scheme promoters are required to

assess all of these impacts using the prescribed methodologies (links to the relevant sections of WebTAG are provided below) and to summarise the results of the analysis in an Appraisal Summary Table (AST). The AST forms a summary of the economic case for a scheme and is used by Highways Investment Board to inform all decisions relating to the selection of a preferred scheme option and the decision to ultimately invest in that option. The proposed MM-ALR scheme has been subject to these processes.

Because WebTAG relates to transport schemes generally, there is a second tier of more detailed appraisal guidance which relates specifically to trunk road schemes and which is contained within the DfT/HA Design Manual for Roads and Bridges (DMRB). In particular, Volumes 11 to 14 of the DMRB contain supplementary appraisal guidance on a number of issues including traffic model building, the assessment of accident impacts and environmental assessment.

The cornerstone of the appraisal process for road schemes is a traffic model. The model is a computer based representation of the physical characteristics of the road network, the behaviour of different types of traffic using the network and the origins and destinations of that traffic. The model is built and calibrated to represent the road network, the 'supply', and the traffic demand upon it at the current time, 'the base year'. A set of independent traffic count and journey time data not used in the calibration process is then used to validate the base year predictions of the model.

Using the behavioural relationships between supply and demand contained within the model, it is possible to alter the network to represent a new road scheme, or change the traffic demand (to represent traffic growth), and identify how traffic flows and speeds change as a result. This provides the information necessary to identify changes in journey times, journey time reliability, vehicle operating costs, tax revenues and accidents across the network in any modelled future year. The information is also used to assess the impact of a scheme in terms of greenhouse gas emissions, air quality and noise.

> A traffic model has been built for the proposed MM-ALR scheme and traffic forecasts prepared for future years. This model consists of a demand model for estimating traffic demand and an assignment model for distributing the traffic across the road network. The model has been developed and fully validated using a series of traffic surveys, journey time surveys and road side interview surveys in addition to data already available from the Highways Agency and local authorities.

There is some uncertainty in relation to forecasts of future traffic levels when modelling future years. These forecasts are made at a national level through the DfT's National Transport Model and are based upon certain assumptions regarding household growth, income growth, changes in fuel price and how these affect the level of car ownership and usage. Changing these core assumptions can affect the level of future year benefits and it is a requirement of WebTAG that different scenarios of future traffic growth are modelled, in addition to the most likely or "Core Scenario". These scenarios are termed the Highest and Lowest Benefits Scenarios and represent the highest and lowest levels of future traffic growth which might reasonably be expected to occur, though such outcomes are considered less likely than the core scenario. It is correct to infer from this that the greater the level of future traffic demand, the greater are the benefits of the proposed scheme (this applies to all road schemes).

It should be noted that WebTAG only regards expenditure such as construction, maintenance and operating costs as 'costs'. Any adverse impacts of a scheme are instead considered as disbenefits and, where monetised, are dealt with on the benefits side of the equation for purposes of calculating the benefit cost ratio metric used by the DfT. The Highest and Lowest

Benefits Scenarios therefore relate to both positive and negative benefits, but not the scheme investment and running costs. The positive and negative benefits associated with the Highest and Lowest Benefits scenarios are included in the summary sheet for the proposed MM-ALR scheme (Option 1). The negative benefits have been included under 'costs' since it is understood that this is how they are to be regarded for purposes of the IA.

As regards the costs of implementing and operating the scheme, WebTAG does not require the production of Highest and Lowest Costs Scenarios as part of the economic assessment. A single "Best Estimate" is used which includes a risk allowance based upon a quantified risk assessment. The estimate and the risk assessment is refined as the scheme progresses towards implementation and design work allows more accurate quantification of the risks and costs. At the end of each scheme stage, the net present value and benefit cost ratio of the scheme are recalculated on the basis of the latest scheme costs before a decision is made by the Highways Investment Board to proceed to the next stage. High and Low estimates of the costs are also not therefore provided in the summary sheet for the proposed MM-ALR scheme.

WebTAG and the DMRB require that the costs and benefits of transport projects are valued at 2002 prices and discounted to 2002. However, for the purpose of the impact assessment these have been converted to 2011 Market Prices using HM Treasury GDP deflator factors and discounted to a present value year of 2012.

The Treasury Green Book requires that the appraisal period over which the costs and benefits should be assessed should extend to the useful life of the assets. In the case of road schemes which create new roadspace, the life of the roadspace is indefinite and, in such cases, WebTAG specifies a maximum appraisal period of 60 years from the year of opening. This is therefore the standard appraisal period for conventional road schemes involving new and widened roads. MM-ALR schemes are not of course conventional road schemes and a large part of the expenditure relates to items which have a 15 year life such as variable message signs, CCTV, telecommunications systems and computer hardware and software. There is however also substantial expenditure on gantries (which have a 30 year life) and the provision of new roadspace in the form of emergency refuge areas constructed at regular intervals adjacent to the hard shoulder (which have an indefinite life). Since those items with a 15 or 30 year life can be renewed at 15 and 30 year intervals, the appraisal work is based upon the maximum 60 year period which is relevant to the emergency refuge areas. The costs of renewing those elements of the scheme with a shorter life than 60 years are of course included in the cost benefit analysis.

**Monetised Costs (Core Scenario forecast – "Best Estimate")**

All MM-ALR schemes have the following types of financial costs. All costs are incurred by government.

- TRANSITION: Cost of Installation.
- RECURRING: Cost of Enforcement of VMSL.
- RECURRING: Cost of Maintenance and Operation.
- RECURRING: Cost of Renewing electronic equipment at 15 year intervals.

In terms of non-financial costs, MM-ALR schemes are appraised against a range of potential impacts as set out in WebTAG. As mentioned above, the impacts which must be considered come under the three main headings of Economy, Environment and Society which are each then subdivided into a number of sub-impacts. A number of these sub-impacts can be monetised.

The proposed scheme has the following negative monetised sub-impacts, or non-financial costs. These are described in the paragraphs below. All monetised values quoted relate to the Core Scenario forecast and are the Best Estimate:

- TRANSITION: Cost of disbenefits to Transport Economic Efficiency during Installation.
- RECURRING: Cost of increased Noise.
- RECURRING: Cost to Climate Change through an increase in greenhouse gas emissions.

*Transition: Installation Costs*

Table 1 provides a breakdown of the current scheme cost estimate, based upon the price provided by scheme contractor. This estimate will be refined as the design progresses. Preparation costs cover the balance of expenditure on the scheme design and preparation of tender documentation. Supervision costs cover the cost of the HA's design agent supervising the contract on behalf of the HA. Works expenditure is the cost of materials and labour for constructing the scheme. Historic or 'sunk' costs incurred to the end of 2011 are excluded.

**Table 1: Installation Costs (2011 Constant Market Prices – Undiscounted – in £m)**

| **Cost** | **2012** | **2013** | **2014** | **2015** | **Total** |
|---|---|---|---|---|---|
| Preparation expenditure profile | **£4.381** | **£0.792** | **£0.032** | **£0.000** | **£5.206** |
| Supervision expenditure profile | **£0.070** | **£1.239** | **£1.147** | **£0.244** | **£2.700** |
| Works expenditure profile | **£3.099** | **£55.069** | **£50.980** | **£10.851** | **£120.000** |
| Land expenditure profile | **£1.013** | **£0.329** | **£0.000** | **£0.000** | **£1.342** |
| **Total** | **£8.56** | **£57.4** | **£52.1** | **£11.0** | **£129.24** |

| | | | | | |
|---|---|---|---|---|---|
| | **3** | **29** | **59** | **95** | **7** |
| **Total (Discounted to 2012)** | **£8.563** | **£55.487** | **£48.691** | **£10.007** | **£122.749** |

Note: The cost of any 'do-minimum' maintenance work which will be undertaken during installation is excluded from the costs in Table 1. This includes replacement of the metal central reserve crash barriers with a vertical concrete barrier.

*Recurring: Enforcement Costs*

The average annual enforcement cost of **£0.2m** over 60 years (2011 Constant Market Prices – Undiscounted), includes costs paid by the HA to cover the costs incurred by the Home Office in processing fixed penalty notices or prosecuting offenders.

*Recurring: Maintenance and Operating Costs*

Maintenance and operating costs have been derived using the HA MM Operational Cost Model spreadsheet.

The average annual maintenance and operating costs are **£0.4m** over 60 years (2011 Constant Market Prices – Undiscounted), These include the costs associated with the maintenance of gantries, mast arms, signs, loops and cabinets, together with the additional costs associated with the use of the hard shoulder, including additional winter gritting, lighting, markings, loops and CCTV systems, plus specialist IT hardware and software.

*Recurring: Renewal Costs*

The average annual renewal cost of **£0.4m** over 60 years (2011 Constant Market Prices – Undiscounted), is based on replacing all electronic equipment at expiry of a 15 year operational life. Gantries will require replacement after 30 years.

*Transition: Transport Economic Efficiency Costs during Installation*

The cost of disbenefits to transport economic efficiency during installation is **£327.1m** (2011 Constant Market Prices – Undiscounted). These costs are primarily the result of the traffic delays caused by the roadworks necessary to construct the scheme. In brief, WebTAG identifies a value of time for different types of vehicles and trip purposes and these values are multiplied by the number of additional hours of delay which are incurred during the roadworks (when a lower 50mph speed limit is in operation over specific lengths of the scheme).

WebTAG values of time depend upon the vehicle type, trip purpose of the occupants, the number of occupants and the time of travel. The value of time also increases over time in line with GDP growth. The value of time for the average vehicle in 2011 at 2011 market prices is £15.14 per hour. Further details of the values and how they are calculated can be found at Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

*Recurring: Noise Costs*

The average annual cost of noise disbenefits is **£0.04m** over 60 years (2011 Constant Market Prices – Undiscounted). These costs are primarily a result of the increase in flow, speed and percentage of HGVs on the motorway due to the provision of an additional traffic lane, which also moves traffic closer to receptors with a consequent increase in noise levels.

Within the appraisal, changes in noise levels are ascribed a monetary value that varies in line with how loud the noise level is. At the quieter 45 dB(A) level, an increase of 1 decibel is valued at £10.34 per household. This increases until at a level of 80 dB(A), a one decibel increase would be valued at £120.58 per household. More detail about how WebTAG values changes in noise can be found at Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

*Recurring: Climate Change Costs*

The average annual cost to climate change is **£6.7m** over 60 years (2011 Constant Market Prices – Undiscounted). The cost arises as a result of an increase in greenhouse gas (primarily $CO_2$) emissions from vehicle traffic within the road network. The increases are the result of additional traffic generated by the scheme (due to the reductions in congestion increasing traffic demand), as well as higher vehicle speeds.

The greenhouse gas emission impacts have been calculated using air quality models of the affected road network, which reflect forecasts of traffic composition, speeds and flows in the with and without scheme scenarios. These traffic datasets are taken from the traffic model in the form of link-based data. The output greenhouse gas emissions are then monetised using official values of non-traded carbon.

WebTAG values of non-traded carbon for all future years and fuel types can be found at Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

**Non-Monetised Costs**

A number of the sub-impacts required to be assessed under WebTAG cannot be monetised and are assessed using a seven point qualitative Assessment Score which ranges from Large Beneficial through Neutral to Large Adverse. Those with a Slight, Moderate or Large Adverse score can be regarded as non-financial costs, whilst those with a Slight, Moderate or Large Beneficial score can be regarded as non-financial benefits.

Based on the current proposals and the environmental assessment, the proposed MM-ALR scheme is expected to have a Slight Adverse impact on the following:

- Townscape - new gantries will be visible from adjacent residential areas above the existing vegetation and landform.
- Heritage and Historic Resources - possible impact of overhead gantries on the setting of a listed building, a scheduled monument and three registered parks and gardens.
- Biodiversity - some impacts to species using habitats adjacent to the scheme are expected.

**Monetised Benefits (Core Scenario forecast – "Best Estimate")**

MM schemes are appraised against a range of potential impacts as set out in WebTAG. As mentioned earlier, the impacts which must be considered come under the three main headings of Economy, Environment and Society which are each then divided into a number of sub-impacts. A number of these sub-impacts can be monetised.

The proposed scheme has the following positive monetised impacts, or benefits. With the exception of an increase in Indirect Tax Revenue, all of the monetised benefits are social rather than financial benefits.

- RECURRING: Benefits to Transport Economic Efficiency through a net reduction in journey times and vehicle operating costs;
- RECURRING: Benefits to Transport Economic Efficiency during Maintenance;
- RECURRING: Benefits to Journey Time Reliability through a reduction in day to day journey time variability;
- RECURRING: Benefits to road safety through a reduction in Accidents.
- RECURRING: Benefits from an increase in Indirect Tax Revenue.

Reducing accidents on the scheme section leads to the following additional benefits:

- RECURRING: A reduction in incident related journey time variability as a result of fewer accidents;
- RECURRING: A reduction in delay as a result of reducing the time spent queuing at an accident site.

The monetised benefits are described in detail within the paragraphs below. All monetised values quoted relate to the Core Scenario forecast and are the Best Estimate:

*Recurring: Transport Economic Efficiency Benefit during Normal Operation*

The average annual transport economic efficiency benefit is £20.2m over 60 years (2011 Constant Market Prices – Undiscounted). This benefit comprises of the following elements (negative values are disbenefits):

- Reduction in journey times: £26.1m
- Increases in vehicle operating costs: -£5.9m

The reductions in journey time arise as a result of the additional traffic capacity provided by allowing use of the hard shoulder. In congested periods, the additional capacity reduces traffic density and increases speeds on the motorway. It also allows additional traffic to reassign to the motorway from other slower routes to reduce its journey time. This in turn reduces journey times on other routes in the network.

**The increase in vehicle operating costs is the sum of changes in both the fuel and non-fuel related costs of all vehicle trips in the network. These will increase if the scheme results in traffic reassigning to a longer (but quicker route), or if vehicle speeds move in**

**either direction away from the optimum speed for fuel efficiency for the type of vehicle concerned. The converse applies as well, so the overall change in vehicle operating costs is the sum of many increases and decreases over the area of the traffic model. Although in the case of the proposed scheme there is an increase in vehicle operating costs, these costs are regarded by WebTAG as a component of the Transport Economic Efficiency impact which is beneficial in overall terms. They are therefore included here, rather than as a "Cost".**

The information required to calculate the benefits is extracted from the traffic model in the form of matrices of trip numbers, travel times and distances between every origin and destination. Matrices are extracted for the 'with' and 'without' scheme scenarios and for different time periods, vehicle type and trip purpose in various future modelled years. The matrices are then fed into a DfT sponsored computer program called Transport User Benefit Appraisal (TUBA) which calculates the total journey times, vehicle operating costs, user charges, carbon emissions, fares and tax revenues in each year of the DfT 60 year appraisal period. All the components are monetised within TUBA and the 'with' scheme costs are subtracted from the 'without' scheme costs to determine the benefit or disbenefit.

WebTAG values of time and vehicle operating costs depend upon the vehicle type, trip purpose of the occupants, the number of occupants and the time of travel. The value of time also increases over time in line with GDP growth. The value of time for the average vehicle in 2011 at 2011 market prices is £15.14 per hour. Further details of the values and how they are calculated can be found at Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

*Recurring: Transport Economic Efficiency Benefit during Maintenance*

The average annual benefit to transport economic efficiency during maintenance is **£6.5m** over 60 years (2011 Constant Market Prices – Undiscounted). These benefits arise primarily because the the central barrier is now being replaced during the scheme installation rather than as a future maintenance item. The delay caused by roadworks imposed for maintenance purposes is therefore reduced.

*Recurring: Journey Time Reliability Benefit*

The average annual journey time reliability benefit is £16.1m over 60 years (2011 Constant Market Prices – Undiscounted). This benefit comprises of the following elements (negative values represent disbenefits):

- Reductions in journey time variability: £19.5m
- Increases in incident related delay: -£3.4m

The reductions in journey time variability arise as a result of making journey times on the scheme section more uniform (day to day variability) and reducing accidents (incident related variability). In particular, congestion, flow breakdown and accidents generate significant variability in journey times which makes them less predictable or reliable. The increase in incident related delay relates to an increase in the rate of incidents affecting running lanes on the motorway due to removal of the hard shoulder ie the permanent removal of the hard shoulder means that incidents which would

previously have been confined to the hard shoulder will now affect a running lane. When this is combined with the additional traffic which will use the scheme section, it results in an increase in the number of incidents and the associated delay. This increase is greater than the reduction in incident related delay arising from a reduction in the accident rate associated with the introduction of MIDAS as part of the MM-ALR scheme.

The information required to calculate the benefits is extracted from the traffic model in the form of the numbers of trips per day using the scheme section, the length of these trips and which routes they use. The information is extracted for various future modelled years for both the 'with' and 'without' scheme scenarios. It is then entered into a DfT sponsored computer program called Incident Cost Benefit Analysis (INCA) which calculates the change in standard deviation of the average journey time for each route at different times of the day. The calculations are undertaken for both the 'with' and 'without' scheme scenarios and repeated for each year of the DfT 60 year appraisal period. A monetary valuation is attached to the changes in standard deviation which are then multiplied by the number of vehicles on each route. A reduction in standard deviation or 'variability' is a benefit and an increase is a disbenefit.

The WebTAG value for the standard deviation of journey time in minutes is equal to 80% of the WebTAG values of time. The value of time per vehicle depends upon vehicle type, trip purpose of the occupants, the number of occupants and the time of travel. The value of time also increases over time in line with GDP growth. The value of time for the average vehicle in 2011 at 2011 market prices is £15.14 per hour. More details can be found at: Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

INCA is also used to calculate the reductions in incident related delay. INCA does this by using the traffic flow inputs and traffic capacity of the carriageways to calculate the total queuing delay generated by accidents and other incidents in both the with and without scheme scenarios on the scheme section. The user supplies the 'with' and 'without' scheme accident and incident rates.

*Recurring: Road Safety Benefits*

The average annual benefit to road safety is **£0.2m** over 60 years (2011 Constant Market Prices – Undiscounted). This reflects the net effect of a small number of accident savings during normal operation and a smaller increase in accidents during construction and maintenance. During normal operation, the benefit arises as a result of a reduction in the accident rate (accidents per million vehicle kilometres) on the scheme section following deployment of the MM-ALR system. There are also accident reductions on other routes as a result of traffic reassigning from these routes to the motorway due to the increase in traffic capacity provided by opening of the hard shoulder ie the reduced journey times attract traffic to the motorway (accident rates for motorways are lower than for other road types).

MM-ALR is a new concept and there is not presently any evidence of the accident reductions which are likely to result from it. Whilst MM-ALR is similar to MM1 in that CM forms a component of both systems, there is a significant safety related difference because the hard shoulder is permanently open. For this reason, it is not considered appropriate to assume that CM will generate the 15% reduction in accident rate observed

in conjunction with its use as a standalone solution, or as part of MM1. However, there are anticipated to be accident savings as a result of introducing the MIDAS system as part of the MM-ALR scheme. MIDAS has been extensively used across the motorway network and the warnings it provides of stationary traffic have proved to be effective in reducing accidents between queuing traffic and fast moving upstream traffic. Evaluation of many past schemes has shown that introducing the system results in an average 13% reduction in the accident rate. A reduction of 13% has therefore been applied to the existing accident rate when assessing the impact of the scheme on section not currently benefiting from MIDAS.

The information required to calculate the accident impact is extracted from the traffic model in the form of the physical characteristics of the road network in the model area and the daily traffic flows on links and junctions. The information is extracted for various future modelled years for both the 'with' and 'without' scheme cases. In addition, the numbers of existing accidents at links and junctions within the network are obtained from police records. All the data is then entered into a DfT sponsored computer program called COBA (Cost Benefit Analysis) which calculates an accident rate for each link and junction and hence produces the number of accidents in the whole network for the with and without scheme cases in each year of the DfT's 60 year appraisal period. COBA attaches a monetary valuation to accidents and sums the total accident costs for each network. The difference in accident costs between the 'with' and 'without' scheme scenarios is the accident benefit of the scheme. In this case, for the duration of normal operation, COBA has predicted a decrease in accident costs across the network as a whole, including on the scheme section itself.

WebTAG values of accidents vary by road and junction type and increase over time in line with forecast growth in GDP. However, the value of a motorway accident in 2011 with the average number and severity of casualties is £94,026 in 2011 market prices. More details of the values and how they are calculated can be found at Department for Transport - Transport Analysis Guidance - WebTAG - Documents - Guidance documents - expert

*Recurring: Indirect Tax Revenue Benefit*

The average annual increase in indirect tax revenue of **£7.6m** over 60 years (2011 Constant Market Prices – undiscounted) arises as a result of changes in the volume, speed and distance travelled on the road network by vehicles. In particular, the scheme provides additional traffic capacity which results in traffic redistributing across the network to reduce its journey time. This can mean some traffic will travel a longer distance, or at a less fuel efficient speed. The tax revenues concerned are VAT and fuel duty.

The increase in tax revenues reflects the fact that the scheme results in an overall increase in the cost of operating vehicles. This is taken account of as a cost to road users and reduces the transport economic efficiency benefit (see above). Although a cost to road users, the additional revenue is a benefit to wider society since it can be used by government to the benefit of society.

Changes in tax revenues are an output of the TUBA program which is described above under the Transport Economic Efficiency benefit. In particular, TUBA calculates the total volume of fuel (petrol and diesel) used by business and non-business users in the road network in the with and without scheme scenarios for each year of the 60 year appraisal period (using information from the traffic model on trip numbers, travel times and distances). The difference in the volume

of fuel used then allows the difference in fuel duty and VAT between the with and without scheme scenarios to be calculated.

### Non-Monetised Benefits

A number of the sub-impacts required to be assessed under WebTAG cannot be monetised and are assessed using a seven point qualitative Assessment Score which ranges from Large Beneficial through Neutral to Large Adverse. Those with a Slight, Moderate or Large Adverse score can be regarded as non-financial costs, whilst those with a Slight, Moderate or Large Beneficial score can be regarded as non-financial benefits.

Based on the current proposals and the environmental assessment, the proposed MM-ALR scheme has no non-monetised benefits.

## 6. Rationale and Evidence for Proportional Approach

The proposed scheme involves substantial expenditure and a Level 5 Analysis has therefore been undertaken. A Level 5 Analysis is the most detailed level of analysis identified in the IA Toolkit document and involves quantifying and, where possible, monetising the costs and benefits of the proposal. In the case of the proposed MM-ALR scheme, the analysis has been undertaken in accordance with the full requirements of WebTAG. In particular, all the potential impacts identified in WebTAG have been quantified and all of these have been assessed using the methodologies prescribed therein.

## 7. Risks and Assumptions

The scheme will be constructed by the Design Build Finance and Operate (DBFO) contractor that manages the M25. The contractor is required to provide a fixed price for executing the works as designed and specified. All risk in this regard is therefore assumed by the DBFO company.

In terms of the magnitude of the benefits, these are primarily dependent upon the accuracy of the traffic model and the future year forecasts of traffic demand. To minimise the risk of error in this regard, the traffic model and forecasts have been prepared in accordance with WebTAG guidance and the model meets DfT performance requirements.

An implicit assumption is that road based travel will continue to have the same level of importance for the full 60 years of the appraisal period. Whilst this seems likely, there is much less certainty as to whether MM-ALR will continue in its present form for this length of time. However, since it is likely that any changes will be the result of innovation from experience or technological development, these can be expected to reduce the operating and maintenance costs and /or increase the benefits.

## 8. Direct Costs and Benefits to Business (One-In, One-Out Approach)

The One-In, One-Out (OIOO) rule means that no new primary or secondary UK legislation that imposes costs on business can be brought In without the identification of existing regulations with an equivalent value that can be removed, or taken Out. The deployment of VMSL and conversion of the hard shoulder to a running lane requires secondary legislation. The proposals are therefore in scope for the OIOO rule.

The proposed scheme imposes no direct costs on business. Its net impact on business is to increase business productivity by improving transport economic efficiency and journey time reliability. Whilst business users also benefit from the reduction in accident costs associated with the scheme, these are considered as indirect benefits and by definition excluded from consideration here. The scheme can therefore be regarded as an "In" regulation with "Zero net cost" to business.

As described in Section 5, the computer program TUBA is used to calculate the monetised transport economic efficiency benefits of the proposed scheme. TUBA also calculate the benefits by different trip purposes: business users, commuting users and other users. These detailed TUBA results reveal that the proportion of transport economic efficiency benefits received by business users is 123% (and consumer users incur a disbenefit of 23% of the total).

The computer programs INCA and COBA are used to calculate the monetised journey time reliability and accident benefits respectively. Unfortunately, INCA and COBA do not disaggregate the journey time reliability and accident benefits between business and non-business users. However, a reasonably reliable estimate of the proportion of the benefits received by business users can be calculated by assuming a national average mix of vehicle types and trip purposes. It is estimated on this basis that 45% of the reliability and accident benefits will accrue to business users.

The total Core Scenario forecast (Best Estimate) benefits to business users over 60 years are as follows (in 2009 market prices, discounted to 2010 at 3.5% for years 0-30 and 3% thereafter). It should be noted that only the transport economic efficiency and journey time reliability benefits are considered to be direct benefits to business. As stated above, the accident impacts are considered to be indirect (second round) benefits and are not included in either the Business NPV on Page 1 of the IA, or as benefits within the Business Assessment on Page 2.

- Transport Economic Efficiency £349.8m
- Journey Time Reliability £153.0m
- *Accidents* *£1.6m*

The equivalent annual values are as follows;

- Transport Economic Efficiency £15.7m
- Journey Time Reliability £6.9m
- *Accidents* *£0.1m*

The use of 2009 market prices and a 2010 present value year for the business assessment differs from other figures in this document which are in 2011 market prices, discounted to 2012. This is a requirement of the current guidance, presumably to ensure that business impacts are quoted in consistent units so they can easily be added to assess the cumulative impact upon business of a number of IAs produced in different years. This would be more difficult if the units were updated each year.

## 9. Wider Impacts

Consideration has been given to the list of potential impacts set out on Pages 16-18 of the IA Toolkit. A number of these are relevant to transport schemes and are recognised as potential impacts of transport schemes in WebTAG. This includes the economic impact on consumers and businesses, safety, crime, greenhouse gases, air quality, landscape, water environment and noise. Where these impacts are non-neutral, they are discussed in Section 5 above.

The potential impact of the proposed scheme upon the justice system and equalities issues are described below. The remaining potential impacts identified in the IA Toolkit are not relevant to the proposed scheme and can be considered as neutral. This includes health, education, waste management and human rights.

### 9.1 Justice System

In Managed Motorway schemes, the enforcement of VMSL will use the Highways Agency Digital Enforcement Camera System (HADECS). The digital photographs are transmitted electronically to a Police Fixed Penalty Office (FPO), where the offending drivers are identified and appropriate action taken. The complete process impacts on the Highways Agency, the Police, the Crown Prosecution Service (CPS) and HM Courts Service. However, experience has shown that a relatively small number of offenders will have to be processed through the Magistrates' Courts.

The resources required to support the enforcement process are the subject of an agreement between the four parties concerned (Managed Motorway National Enforcement Strategic Agreement, December 2009). The intention of the agreement is to ensure that enforcement of managed motorways will have minimal impact on the normal procedures of the Police, CPS and Courts. To maximise efficiency, ensure consistency and minimise financial impact it is proposed to identify key Police Forces, CPS offices and Magistrates Courts in each of the seven Highways Agency Regions and to process enforcement cases centrally on a regional basis.

### 9.2 Equalities

The proposed MM-ALR scheme would not introduce any additional regulatory restrictions on the use of the motorway over and above those pertaining to the existing use. As such there are no specific impacts in terms of the public sector duties towards disability, gender (including gender identity), race, pregnancy and maternity, religion or belief, age, sexual orientation and discrimination in relation to marriage and civil partnership. Furthermore, whilst the use of motorways is restricted to certain categories of driver, based on tested ability to operate a vehicle, there is no additional or lesser restriction for the use of a managed motorway and, as such, the effect in terms of furthering equality aims has been assessed as neutral.

## 10. Recommendation, Implementation and Review

### 10.1 Proposed Solution

Two versions of the Managed Motorway system have been considered as options for solving the current congestion problems between J5-7 of the M25. The first is MM1 which allows temporary use of the hard shoulder as a running lane in congested conditions only. The second is MM-ALR which involves permanent use of the hard shoulder as a running lane. MM-ALR is the preferred option since it has lower implementation costs and higher benefits.

The MM-ALR system includes MIDAS and Controlled Motorway (CM) technology. The purpose of the CM element of MM-ALR is to reduce the incidence of flow breakdown by using Variable Mandatory Speed Limits (VMSL) of 60, 50 and 40 mph to reduce the likelihood of faster moving

upstream traffic 'catching up' with a pocket of slower moving traffic and causing traffic density in this region to reach a level where flow breakdown occurs. By reducing the incidence of flow breakdown, there is less variation in journey times and journey times become more predictable or 'reliable'.

Converting the hard shoulder to a running lane reduces average journey times as well as improving journey time reliability. This is achieved because the hard shoulder provides additional road space, thereby reducing traffic density and increasing traffic speeds above what they would otherwise be.

In order for the CM element of the MM-ALR scheme to be successful, it is essential that the variable speed limits which form part of the CM system are complied with. This requires the speed limits to be mandatory. Secondary legislation is required to allow mandatory variable speed limits to operate.

Enforcement of the VMSL is planned to be carried out using a combination of speed enforcement cameras and traditional enforcement by the Police. The Highways Agency Digital Enforcement Camera System (HADECS) will be used to automatically monitor VMSL.

A summary of the costs and benefits of the proposed MM-ALR scheme, based upon the Core Scenario (Best Estimate) forecast, is provided in Table 2. The costs and benefits cover the standard DfT 60 year appraisal period from 2015. In accordance with the Treasury Green Book, the discount rate is 3.5% per year for 30 years from the present year and 3% per year thereafter.

**Table 2 – Summary of 60 year Costs and Benefits (2011 Market Prices, Discounted to 2012)**

| **Type of Cost (A)** | **Cost (£m)** | **Type of Benefit (B)** | **Benefit (£m)** |
|---|---|---|---|
| Installation | 122.7 | Journey Times (TEE) | 620.6 |
| Enforcement | 3.7 | Vehicle Operating Costs (TEE) | -139.6 |
| Operation and Maintenance | 9.4 | Delays during Maintenance (TEE) | 155.6 |
| Renewal | 8.9 | Journey Time Reliability | 463.9 |
| Delays during Installation (TEE) | 316.0 | Incident Related Delay | -80.6 |
| Noise | 1.0 | Additional Tax Revenue | 180.1 |
| Greenhouse Gases ($CO_2$) | 160.2 | Accidents | 4.0 |
| **ALL (TOTAL A)** | **£621.9** | **ALL (TOTAL B)** | **£1,204.0** |

| | |
|---|---|
| **Net Present Value (B-A)** | **£582.1m** |
| **Benefit Cost Ratio (B/A)** | **1.9** |

### 10.2 Implementation Plan

Construction of the proposed MM-ALR scheme is due to commence in 2012 with completion in 2014.

### 10.3 Post Implementation Review (Evaluation)

The post implementation review plan is attached as Annex 1.

## Annex 1: Post implementation review (PIR) plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

| |
|---|
| **Basis of the review:** [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review , or there could be a political commitment to review (PIR)];<br>More information on POPE can be found on the HA web site at: Highways Agency - Post Opening Project Evaluation (POPE) |
| **Review objective:** [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?] |
| **Review approach and rationale:** [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach] |
| **Baseline:** [The current (baseline) position against which the change introduced by the legislation can be measured] |
| **Success criteria:** [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]<br>Outurn costs and benefits to be consistent with predicted costs and benefits. |
| **Monitoring information arrangements:** [Provide further details of the planned/existing arrangements in place that will allow a systematic collection systematic collection of monitoring information for future policy review] |
| **Reasons for not planning a review:** [If there is no plan to do a PIR please provide reasons here] |

## APPENDIX B – CONSULTATION RESPONSE FORM

## CONSULTATION RESPONSE FORM

### MANAGED MOTORWAY SCHEME – M25 Junctions 5 to 7

Please complete this pro-forma and send to the address below:

John Martin
Highways Agency
Federated House
London Road
Dorking
RH4 1SZ

Or alternatively you can respond to the consultation by email:

M25Junction5to7MM@highways.gsi.gov.uk

**PART 1** - Information about you

| | |
|---|---|
| Name | |
| Address | |
| Postcode | |
| Email | |
| Company Name or Organisation (if applicable) | |
| Please tick one box from the list below that best describes you/ your company or organisation. | |
| ☐ | Small to Medium Enterprise (up to 50 employees) |
| ☐ | Large Company |
| ☐ | Representative Organisation |
| ☐ | Trade Union |
| ☐ | Interest Group |
| ☐ | Local Government |
| ☐ | Central Government |
| ☐ | Police |

| | |
|---|---|
| ☐ | Member of the public |
| ☐ | Other (please describe): |
| If you are responding on behalf of an organisation or interest group, how many members do you have and how did you obtain the views of your members: | |
| If you would like your response or personal details to be treated confidentially please explain why: | |

**PART 2** - Your comments

| | | |
|---|---|---|
| 1. Do you consider that the proposal to introduce the Managed Motorway Scheme on the M25 between Junctions 5 to 7 will lead to an improvement in travelling conditions on this section of motorway? | Yes ☐ | No ☐ |
| Please add any comments: | | |

| | | |
|---|---|---|
| 2. Are there any aspects of the proposal to introduce the Managed Motorway Scheme on the M25 between Junctions 5 to 7 which give you concerns? | Yes ☐ | No ☐ |

| | | |
|---|---|---|
| If yes, please give your comments: | | |
| 3. Are there any additional comments you would like to make about the proposal to introduce the Managed Motorway Scheme on the M25 between Junctions 5 to 7? | Yes ☐ | No ☐ |
| If yes, please give your comments: | | |

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# APPENDIX D – Q&A FOR M25 JUNCTIONS 5-7

**Q. What is happening?**

A. The M25 motorway is a key strategic route within the Highways Agency network orbiting London. The section for which Variable Mandatory Speed Limits are being consulted on is 12.2 miles long and runs between junction (J)5 (M25 J5 interchange with M26 and A21) and J7 (M23). The M25 was completed in 1986 and was constructed to dual three lane motorway D3M standard. This section of the carriageway has never been widened and remains as D3M standard.

The M25 between junctions 5 and 7 is congested during the weekday morning and evening peak hours and also at other times when traffic flows are heavy. The average two-way daily traffic flow on the scheme section exceeds 130,000 vehicles. On each carriageway, hourly traffic flows exceeded the flow instability point of 85% of the nominal 6000 vehicles per hour capacity on an average of more than 2.9 hours a day during 2010. Traffic flows are above 50% of capacity for between 12 and 12½ hours each day.

Between 2008 and 2010 there were 375 recorded casualties resulting from 245 recorded personal injury accidents. The resultant accident rate is 0.089 Personal Injury Accidents per million vehicle kilometres and the resultant casualty rate is 0.138 per million vehicle kilometres. In line with policy advice, HA national data is now reported in terms of casualties. The HA motorway casualty rate for 2008-2010 was 0.177 per million vehicle kilometres, higher than the figure recorded for M25 Junction 5-7.

**Q. Why is the HA consulting?**

A. This consultation will provide an opportunity for interested parties and individuals to comment on the legislative changes required to allow for the implementation of Variable Mandatory Speed Limits and introduction of the concept of the Emergency Refuge Area within a managed motorways scheme on this section of the M25.

**Q. Who can respond to this?**

A. This consultation is available for anyone to respond to, including organisations that would be affected by the implementation of Variable Mandatory Speed Limits. The consultation is aimed at any affected stakeholder groups.

**Q. Is the introduction of Variable Mandatory Speed Limits likely to be effective?**

The introduction of Variable Mandatory Speed Limits on sections of the M6 and M42 round Birmingham have shown a reduction in congestion and collisions and improved traffic flows resulting in more reliable journey times.

Experience from these schemes suggests that there is scope to further reduce both the capital and operating costs, whilst continuing to meet congestion reduction objectives.

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**Q. Why have a variable speed limit? Why not a fixed speed limit?**

A. By varying the mandatory speed limit the Highways Agency can manage the flow of traffic more effectively. The speed limits displayed on the motorway will take account of prevailing traffic conditions with the aim of ensuring the smooth flow of traffic. Variable speed limits are a key feature of managed motorways - which is about modernising the operation of our motorways and finding the best solution for different parts of the network.

**Q. How does it work?**

A. The Variable Mandatory Speed Limits and messages shown on the Variable Message Signs are automatically displayed in response to the level of congestion. Sensors in the road surface detect the speed, volume and flow of traffic which then calculate the optimum speed to keep traffic moving, reducing the level of 'stop-start' traffic which leads to congestion. Drivers see the current speed limit displayed on electronic signals on the overhead gantries and Variable Message Signs located in the verge. The speed limits can also be set by control room operators if required.

**Q. When are the variable speed limits likely to become mandatory?**

A. We are hoping to implement the Variable Mandatory Speed Limits in 2015.

**Q. So what is the point of the consultation?**

A. The Highways Agency is committed to effective consultation and complies with the Government's Consultation Principles. Effective consultation with affected stakeholders brings to light valuable information which we are able to use to design effective solutions and mitigate any concerns.

Following the consultation period, responses will be issued where appropriate and a summary report compiled which will provide an analysis of the responses and provide justification for the selected option.

**Enforcement Q&A**

**Q: Are Variable Mandatory Speed Limits linked to safety cameras?**

A: Yes, and as the Variable Mandatory Speed Limits change, the safety cameras will be automatically adjusted to suit the currently signalled limits.

**Q: How are you going to enforce the speed limits?**

A: The speed limits are enforced by the Police.

There are cameras on the gantries and variable message signs for use in enforcement. As per the Highway Code, any sign in a red circle is mandatory so the speed limits are legally enforceable.

**Q: How will the speed limits be enforced during normal motorway conditions?**

A: Enforcement is a matter for the police, who will continue to enforce the national speed limits, as on all roads including motorways.

**Q: What happens if I travel past a signal/speed limit when it changes?**

A: When the cameras are in operation there is a built in time delay from the switching of the signal/speed limit to when the cameras will actually enforce – once mandatory. When there is a change in the speed limit displayed on the speed limit sign and if the vehicle had passed that sign ten seconds earlier, then the speed limit applicable to the driver of the vehicle will be the speed limit displayed on that sign prior to it changing.