

APPENDIX A: IMPACT ASSESSMENT

Summary: Intervention & Options

Department /Agency: Highways Agency		Title: Impact Assessment M20 Junctions 4 to 7 Controlled Motorway	
Stage: Final Proposal	Version: DRAFT	Date: 05 th May 2009	
Related Publications: Consultation documents			

Available to view or download at:

<http://www.highways.gov.uk/m20controlledmotorway>

Contact for enquiries: Hugh Maxwell

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

Secondary legislation is required to implement variable mandatory speed limits on the M20 Motorway between junctions 4 and 7 (both directions). The variable mandatory speed limits will be enforced by the Police.

What are the policy objectives and the intended effects?

The implementation of variable mandatory speed limits on the M20 junctions 4 to 7 will improve traffic flow, reduce accidents and reduce carbon emissions.

What policy options have been considered? Please justify any preferred option.

Option 1: (Baseline) Do nothing. To do nothing will retain the status quo for existing daily congestion, accident and pollution levels increasing pro-rata year on year.

Option 2: (Preferred) Secondary legislation in the form of regulations made under section 17 of the Road Traffic Regulation Act 1984 will be required. This policy is expected to:

- Reduce congestion
- Reduce the frequency of accidents
- Reduce driver stress
- Provide more reliable journey times
- Reduce carbon emissions

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects? A period of monitoring and assessment will begin prior to commissioning and will continue for six months thereafter. The assessment will optimise the system to ensure that full benefits are achieved.

Ministerial Sign-off For final proposal/implementation stage Impact Assessments:

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 Minister:

To be signed once Statutory Instrument is available for signature

.....Date:

Summary: Analysis & Evidence

Policy Option: 2

Description: To make regulations to introduce Variable Mandatory Speed Limit on the M20 between Junctions 4 and 7

COSTS	ANNUAL COSTS		Description and scale of key monetised costs by 'main affected groups' Installation costs Journey times Maintenance
	One-off (Transition)	Yrs	
	£ 12,400,000	1	
	Average Annual Cost (excluding one-off)		
	£ 240,000		Total Cost (PV) £ 16,500,000
Other key non-monetised costs by 'main affected groups'			

BENEFITS	ANNUAL BENEFITS		Description and scale of key monetised benefits by 'main affected groups' Reduction in accidents Reduction in carbon emissions Improvement in journey time reliability
	One-off	Yrs	
	£ 1,385,000		
	Average Annual Benefit (excluding one-off)		
	£ 1,385,000		Total Benefit (PV) £ 23,800,000
Other key non-monetised benefits by 'main affected groups' Reduction in noise levels			

Key Assumptions/Sensitivities/Risks

The effects of a Controlled Motorway scheme on the M20 between junctions 4 to 7 have been assumed similar to the M25 Junctions 10 to 16, which has had Controlled Motorways in operation since 2002.

Price Base Year 2008	Time Period Years 30	Net Benefit Range (NPV) £6,300,000 - £11,000,000	NET BENEFIT (NPV Best estimate) £ 7,300,000
-------------------------	-------------------------	--	---

What is the geographic coverage of the policy/option?	England M20 J4 to J7			
On what date will the policy be implemented?	2009			
Which organisation(s) will enforce the policy?	Police			
What is the total annual cost of enforcement for these	£ 83,000			
Does enforcement comply with Hampton principles?	Yes			
Will implementation go beyond minimum EU requirements?	N/A			
What is the value of the proposed offsetting measure per year?	£ N/A			
What is the value of changes in greenhouse gas emissions?	£ 650,000			
Will the proposal have a significant impact on competition?	No			
Annual cost (£-£) per organisation (excluding one-off)	Micro £0	Small £0	Medium £0	Large £0
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices)				(Increase - Decrease)
Increase of	£ N/A	Decrease	£ N/A	Net Impact £ N/A

Key:

Annual costs and benefits:	(Net) Present

Evidence Base

Note: This proposal has been assessed against the guidance that DfT uses to assess proposals based on the same principles as other Impact Assessments but some presentation aspects may differ.

BACKGROUND

The Highways Agency is proposing to implement regulations to introduce variable mandatory speed limit on the M20 between junctions 4 and 7 (“the Controlled Motorway Scheme”). The Controlled Motorway Scheme together with the ability to enforce the variable mandatory speed limits will deliver a number of positive benefits with regard to safer roads and a reduction in journey times without the need for more road construction. These are:

- Making best use of the existing infrastructure;
- Reducing congestion, increasing the throughput of traffic and improving the journey time reliability;
- Reduced traffic flow breakdown;
- Reduced accidents; and
- Reduced carbon dioxide emissions.

Since 1995, a Controlled Motorway has been operational on the western quadrant of the M25 between Junction 10 (A3) and Junction 15 (M4). In 2002, the scheme was extended to cover Junctions 15 (M4) to 16 (M40).

Controlled Motorways have the following key features:

- Mandatory speed control, using variable speed limits displayed on special Advanced Motorway Indicators (AMIs) equipped with ‘Red Rings’, mounted above each lane on standard gantries;
- Automatic signal setting in response to traffic conditions, driven by the Motorway Incident Detection and Automatic Signalling (MIDAS) system, with additional driver information on Enhanced Message Signs (EMS); and
- Provision of speed enforcement using the Highways Agency Digital Enforcement Camera System 2 (HADECS 2) which will be mounted on the gantries.

The variable mandatory speed limit signals will be displayed on gantries. The signals mounted on overhead gantries are capable of automatically displaying one of three mandatory settings, 40 mph, 50 mph or 60 mph. All the lanes above the main carriageway will automatically display the mandatory speed limit as appropriate to the road conditions. In addition, 40 mph signals are set to protect backs of queuing traffic. Lower speed limits such as 20 mph or 30 mph can be manually set by operators when considered necessary for the safety of the travelling public or those working within the carriageway.

A detailed “before and after” study was carried out when the Controlled Motorway was implemented on the M25 between Junctions 15 and 16. The study team included recognised experts in traffic behaviour, air quality, noise pollution, accident analysis, statistics and economic appraisal. The project team was accountable to a specially created Steering Group, comprising suitably qualified representatives from the Department for Transport and the Highways Agency. Methodology and results were reviewed on at least a quarterly basis, with interim meetings focusing on more technical detail as required.

In determining the methodology for guiding the business casework, the Project Steering Group recommended that the New Approach to Traffic Appraisal be adopted. The Business Case itself was established using a “before and after” comparison of key variables such as journey time, safety and capacity. The “before” scenario was the conventional gantry-mounted lane-signalling and cantilever mounted carriageway signals, with manually set signals and automatic queue protection using advisory speed limits. The “after” scenario (after implementation, i.e. with Controlled Motorway operational) was Controlled Motorways with variable mandatory speed limits, speed enforcement and congestion algorithms.

The project team conducted a comprehensive data analysis as part of developing the business case methodology. There were several sources used to collect this data:

- Carriageway loop detectors provided minute-by-minute data on flows, speeds, vehicle type and vehicle spacing;
- Specific journey data from instrumented vehicles provided information about stop-start behaviour and verified journey time measurements;
- Automatic Number Plate Recognition data provided a larger volume of information on actual journey times between Junctions 15 and 16;
- Noise surveys assessed the impact of the scheme on noise levels close to the road;
- Typical driving profiles (from the instrumented vehicles) and a large database for vehicle emission values were used to measure and model exhaust emissions; and
- STATS19 injury accident records provided extensive accident data.

The studies showed that there were impacts from introducing Controlled Motorways on the M25. The effects are described in the M25 Controlled Motorways Summary Report (HA159/04). Table 1 summarises the key outcomes.

Table 1 - Impacts of Controlled Motorways on M25

Impact Area	Indicators of Impacts	Overall Improvement (Y/N)
Safety	Safety benefits arose as a result of a culmination of impacts on the driving environment and on driver behaviour. Injury accidents were reduced by 10%, and there was a 20% drop in the ratio of injury to damage only accidents.	Y
Journey times	There was an increase in peak-time journey times on the clockwise carriageway and a decrease on the anticlockwise carriageway. Combining the two carriageways made the peak-time effect of Controlled Motorways neutral. Off-peak, there were small increases in journey times on both carriageways.	N
Journey time reliability	There was a small improvement in overall journey time reliability, indicating a smoother journey.	Y
Emissions	Emissions decreased overall by between 2% and 8%. The smoothing effect of the system reduced fuel consumption, with a commensurate impact on emissions.	Y
Noise	Weekday traffic noise adjacent to the scheme was reduced by 0.7 decibels.	Y
Throughput	There was no increase in the peak 1-hour throughput.	N
Speed limit compliance	There was a reduction of 5% in the proportion of drivers exceeding the 40mph speed limit, which is now displayed as a mandatory limit.	Y
User reaction	The controlled motorway scheme was well accepted and there was a perception of key benefits.	Y

Subsequent to these studies, additional work has been carried out to determine the effect of Controlled Motorways on safety, using additional data (up to the end of 2006). This analysis¹ has shown that the best estimate of the effect of Controlled Motorways on injury accidents is a reduction of 15%.

¹ Crinson L, Notley S & Lawton (2007). Safety Benefits of the M25 Controlled Motorway 1990 to 2006 Data UPR/SSI/165/07, Wokingham

M20 CONTROLLED MOTORWAY SCHEME JUNCTIONS 4 TO 7

As part of the work to tackle congestion on the motorway and trunk road network, the Highways Agency is planning to introduce mandatory variable speed limits on the M20 between Junctions 4 and 7 (“the Controlled Motorway Scheme”). Traffic congestion and pollution has been a problem for a considerable time and improvements to Junction 4 and the adjoining roads have been implemented to help alleviate these problems. The proposed Controlled Motorways Scheme will enhance these new civil engineering works.

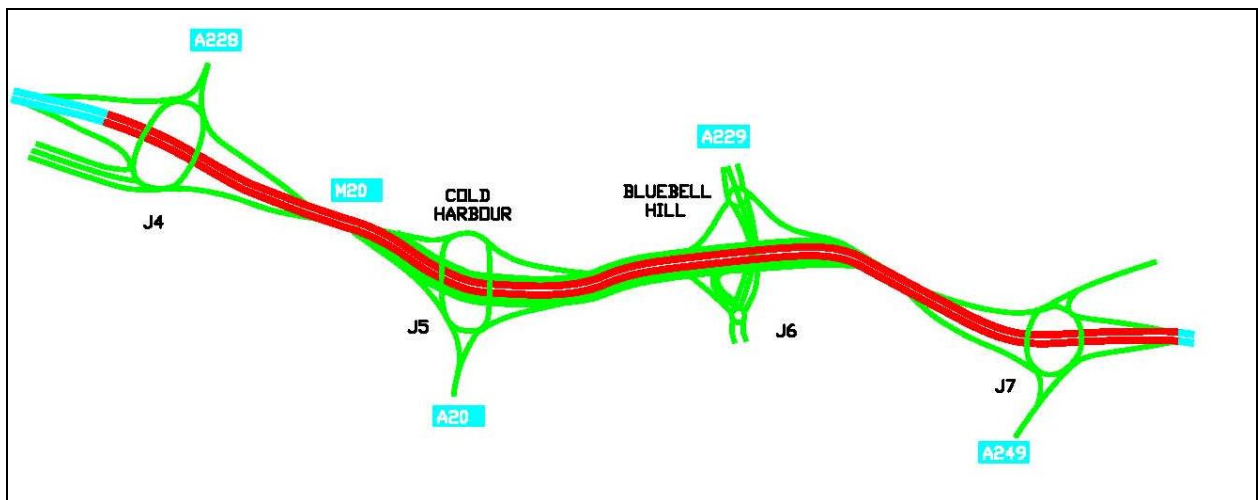
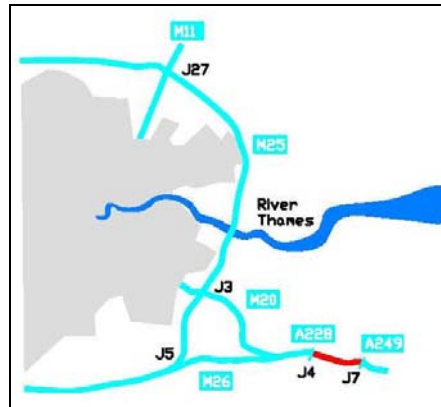


Figure A: Scheme Map

THE EFFECT OF INTRODUCING THE CONTROLLED MOTORWAYS SCHEME

The benefits of introducing the Controlled Motorway Scheme on to the M20 junction 4 to 7 have been modelled against those observed on the M25 between junctions 10 and 12

The impact of the introduction of Controlled Motorways is proportional to the flow levels and to the distance over which the scheme is implemented.

The impacts are expressed as per vehicle or per vehicle km; these have been factored according to the measured flow levels on the M20 and the distance over which the scheme is to be applied.

The economic values in the Summary page have been expressed in 2008 prices. The Appraisal Period has been set at 30 years because this is a technology project and the entire infrastructure would need to be replaced after 30 years.

The costs and benefits of the scheme over the 30-year Appraisal Period have been calculated in accordance with the Department for Transport’s Cost Benefit Analysis guidance². Changes in the value of time and vehicle occupancies have been obtained from the Values of Time and Operating Costs guidance³.

The anticipated effects of the scheme in future years have been estimated by applying a flow growth to the current measured flow profile. A medium growth rate has been applied to calculate the best estimate for the Net Benefit of the scheme, quoted in the Summary Information. Low and high flow growth rates have been applied to provide estimates of the sensitivity of the impacts; these have been used to calculate the Net Benefit Range (also quoted in the Summary Information). The traffic growth for the M20 used in the calculations was:

Table 2 - Traffic growth

Years	Flow growth rate (per annum)		
	Low	Medium	High
1-5	1%	2%	3%
6-10	1%	1%	2.5%
11-15	0.5%	1%	2%
15-20	0.5%	0.5%	2%
20-30	0.5%	0.5%	1%

Benefits

The benefits of Controlled Motorways that can be expressed as economic values come from:

- a reduction in accidents;
- a reduction in carbon emissions; and
- an improvement in journey time reliability.

² TAG UNIT 3.5.4: http://www.dft.gov.uk/webtag/webdocument/3_Expert/5_Economy_Objective/3.5.4.htm

³ TAG UNIT 3.5.6: http://www.dft.gov.uk/webtag/webdocument/3_Expert/5_Economy_Objective/3.5.6.htm

The current accident rate of 11.9 injury accidents/100m veh km was obtained from the Area 4 Road Safety Statement – 2005 (source: InterRoute). (The national average is 9.8 injury accidents/100m veh km.) A 15% reduction in accidents provides an economic benefit of £537,000 in the first year; the benefits in future years have been estimated using the flow growth rates in Table 2.

On the M25, carbon dioxide emissions were reduced by 1,184 tonnes in the first year. Factoring this number by the relative flows on the M25 and M20, and the relative lengths of the schemes, provides an estimated reduction in carbon dioxide emissions on the M20 of 574 tonnes in the first year. This has been converted to a carbon value and then to an economic value, as described in the department for Transport Greenhouse Gases Sub-Objective guidance⁴. The economic benefit for the first year is estimated to be £15,600. The benefits in future years have been estimated using the flow growth rates in Table 2, plus the predicted changes in individual vehicle emissions contained in the Department's guidance.

On the M25, journey time reliability was measured across a variety of day types. On a typical weekday (Tuesday, Wednesday, Thursday), journey time reliability improved: there was a reduction in standard deviation of 0.005. On other days (Mondays, Fridays, Saturdays and Sundays), no discernible change was detected. The benefits for the M20 on a typical weekday have been converted to an economic value as described in the Reliability Sub-Objective guidance⁵. The economic benefit for the first year has been estimated by multiplying this by 150 (the number of typical weekdays in a year). The effect on the other 206 days of the year has been assumed to be neutral. The benefit in the first year is estimated to be £307,000. The benefits in future years have been estimated using the flow growth rates in Table 2.

Costs

The economic value of Controlled Motorways comes from:

- installation costs;
- maintenance costs (including renewal after 15 years);
- enforcement costs; and
- an increase in overall journey times.

The installation cost for the Controlled Motorway Scheme on the M20 is £12.4m. This covers all the required infrastructure (gantries, Controlled Motorways Indicators, EMS, enforcement and CCTV cameras and MIDAS), plus management costs.

The maintenance and renewal costs of the system have been based on the generic values developed from the M25. These are typically £4,300 per year (current prices), plus a renewal cost after 15 years of £2.74m (current prices).

The Police will enforce the Controlled Motorway Scheme. The Highways Agency will pay an estimated annual administration charge of £83,000 to the Police authority, in this case Kent.

⁴ TAG UNIT 3.3.5: http://www.dft.gov.uk/webtag/webdocument/3_Expert/5_Economy_Objective/3.3.5.htm

⁵ TAG UNIT 3.5.7: http://www.dft.gov.uk/webtag/webdocument/3_Expert/5_Economy_Objective/3.5.7.htm

On the M25, the peak-time effect of Controlled Motorways on journey times was neutral (see Table 1). Off-peak, there were small increases in journey times (the signals slow down the traffic, but flow breakdown was unlikely to occur). Overall, this meant that there was a small disbenefit in journey times from the introduction of Controlled Motorways.

To estimate the effect on journey times for a generic motorway, Faber Maunsell and TRL developed a complex spreadsheet that models the effect of Controlled Motorways at various flow levels. Controlled Motorways show a journey time benefit at certain flow levels, a disbenefit at others and are neutral at other times.

The flow profile for the M20 has been fed into the Journey Time spreadsheet, and the yearly traffic growth has been applied. This has provided a yearly total for the impact of the M20 scheme on journey times. The effect in the first year is estimated as a disbenefit of £23,100. The journey time impacts have been added to the costs in the Summary Information.

Breakdown of Net Benefit of the Scheme

The following table details the costs and benefits that contribute to the Net Benefit in the Summary Information page. All costs and benefits are over a 30-year period and are expressed as Present Value (PV) prices (i.e. the value today of amounts of money in the future).

Table 3 -Costs and Benefits

Type	Cost	Type	Benefit
Installation	£12,400,000	Accidents	£15,200,000
Maintenance	£80,000	Journey time reliability	£8,200,000
Renewal	£1,570,000	Carbon	£400,000
Enforcement	£1,520,000	Total	£23,800,000
Journey time	£930,000		
Total	£16,500,000	Net Benefit	£7,300,000

Air Quality

In addition to the Controlled Motorway Scheme, weather stations and air quality stations have been installed to measure pollution levels, with evaluations to be conducted over a period prior to and after the go live date of the scheme.

Enforcement and Sanctions

The proposed legislation does not introduce any new offences or sanctions. Variable mandatory speed limits will be enforced using HADECS 2.

Pre Implementation Review

A period of traffic behaviour and assessment will take place before the Controlled Motorway Scheme is made active.

STAKEHOLDER ENGAGEMENT

Consultation

Prior to the scheme's introduction a Project Board was set up to discuss the proposals, this board consisted of members from:

- The Highways Agency;
- Area 4 Managing Agent Contractor (MAC);
- Kent Police;
- Transport Research Laboratory (TRL);
- Kent County Council; and
- Maidstone Borough Council.

Additional publicity material will be sent to:

- Freight and other road user organisations;
- Kent Fire and Rescue Service;
- Local Road User Groups; and
- Other key stakeholders.

SUMMARY AND RECOMMENDATIONS

The Highways Agency recommends Option 2, outlined at the beginning of this document. The Controlled Motorway Scheme has the potential to produce considerable benefits by aiming to reduce congestion, improve journey time reliability, reduce accidents, driver stress and pollution levels.

Business case benefits have already been assessed on a similar scheme operating on the M25 between junctions 10 and 15 since 1995, and this was extended to junction 16 in 2002. The following benefits have been demonstrated as part of this scheme:

- A reduction in emissions;
- A reduction in noise levels;
- A reduction in vehicle operating costs;
- Improved driver behaviour; and
- A reduction in driver stress.

SPECIFIC IMPACT TESTS

Competition Assessment

The Office of Fair Trading (OFT) guidelines have been followed in order to assess the impact of the proposed scheme upon market competition.

It has been concluded that there will be not be any adverse effects upon competition in the marketplace. The introduction of variable mandatory speed limits will reduce travel times and improve journey reliability which will contribute positively to competition in the marketplace. There will be competition benefits resulting from employment density change, due to improved journey times and productivity working.

Small Firms Impact Test

The Department for Business Enterprise and Regulatory Reform guidelines have been followed in order to assess the impact of the proposed scheme upon small firms. The proposed scheme will not have an adverse effect upon small firms. The proposals do not impose any new or increased burden. Small businesses have not been consulted separately. However, the Highways Agency and their partners will be sending targeted information on the scheme to numerous organisations within the area.

Legal Aid

The Department for Constitutional Affairs guidelines have been followed in order to assess the impact of the proposed scheme upon Legal Aid.

There are no new criminal sanctions or civil penalties that will be introduced as part of the M20 Controlled Motorway Scheme. Therefore, a full Legal Aid impact test is not required.

Sustainable Development

The Government's Sustainable Development Strategy guidelines have been followed in order to assess the impact of the proposed scheme upon sustainable development.

The proposed scheme will not have an adverse effect upon sustainable development.

Carbon Assessment

The Government's carbon assessment guidelines have been followed in order to assess the impact of the proposed scheme upon carbon emissions. The M20 Controlled Motorway scheme will provide a reduction in the emission of harmful gases and noise pollutants. The proposed scheme will not have an adverse effect upon carbon emissions.

Other Environmental

Full environmental assessments have been carried out in accordance with the Highways Agency national and local environmental strategies and policies including:

- Towards a Balance with Nature: The Highways Agency Environmental Strategic Plan; and
- Living with Roads: An Environmental Strategy for England's Main Roads.

Health Impact Assessment

The Department for Health guidelines have been followed in order to assess the impact of the proposed scheme upon public health.

A full health impact assessment will not be necessary as the proposed scheme will not have an adverse impact upon public health.

Race Equality

The Commission for Race Equality guidelines have been followed in order to assess the impact of the proposed scheme upon race equality.

The proposed scheme aims to establish a sustainable balance between wider economic growth, social inclusion and environmental objectives. It is therefore not expected that the proposed scheme will impact upon race equality.

Disability Equality

The Disability Rights Commission guidelines have been followed in order to assess the impact of the proposed scheme upon the disabled.

A full disability impact assessment will not be necessary as the proposed scheme will not have an adverse impact upon the disabled.

Gender Equality

The Government Office guidelines have been followed in order to assess the impact of the proposed scheme upon gender equality.

A full gender assessment will not be necessary as the proposed scheme does not discriminate between genders.

Human Rights

The Ministry of Justice guidelines have been followed in order to assess the impact of the proposed scheme upon human rights.

The proposed scheme will not have an adverse effect upon human rights.

Rural Proofing

The Commission for Rural Communities guidelines have been followed in order to assess the impact of the proposed scheme upon rural circumstances and needs.

The proposed scheme will not have an adverse effect upon rural circumstances and needs.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be Appendices.

Type of testing undertaken	<i>Results in Evidence Base?</i>	<i>Results Appendices?</i>
Competition Assessment	Yes	No
Small Firms Impact Test	Yes	No
Legal Aid	Yes	No
Sustainable Development	Yes	No
Carbon Assessment	Yes	No
Other Environment	Yes	No
Health Impact Assessment	Yes	No
Race Equality	Yes	No
Disability Equality	Yes	No
Gender Equality	Yes	No
Human Rights	Yes	No
Rural Proofing	Yes	No