

# Annex A – Impact Assessment



## Summary: Intervention & Options

<b>Department /Agency:</b> Highways Agency	<b>Title:</b> Impact Assessment of Birmingham Box Active Traffic Management Phases 1 and 2	
<b>Stage:</b> Consultation	<b>Version:</b> 1	<b>Date:</b> 8 <sup>th</sup> January 2009
<b>Related Publications:</b> Birmingham Box Active Traffic Management Phases 1 and 2 Consultation Pack		

**Available to view or download at:**

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

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

The Birmingham Motorway Box comprises sections of the M42, M6 and M5 and provides a “ring road” to the West Midlands conurbation. Most of the box is already under severe pressure and suffers from congestion. These sections of motorway are among the highest congested strategic trunk roads in the region. They have very high traffic volumes with a very high HGV proportion - up to 35%. The resulting congestion increases business costs and reduces mobility. Action was required to improve and maintain traffic flows, and hence productivity, in the area.

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

The Highways Agency proposes to introduce Hard Shoulder Running and Variable Mandatory Speed Limits for strategic areas of the motorway network on the Birmingham Box. The project aims to fulfil the business needs for DfT productivity Transport Innovation Funding (TIF) schemes to ensure there is a sustainable balance between wider economic growth, social inclusion and environmental objectives. The objectives of these measures are to: Reduce congestion at recognised bottlenecks; Achieve best use of the existing road space; Allow faster response to incidents and reduce clear-up times; Reduce the impact of accidents/incidents; and, provide faster, more reliable journey times.

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

The DfT programme of Multi-Modal Studies arose from the Government's A New Deal for Trunk Roads in England (July 1998). This proposed a series of studies to develop solutions to problems identified on key parts of the strategic road network. The Birmingham Box motorways were identified as future priorities and the scheme was put forward for Transport Innovation Funding (TIF) Productivity funding.

The Birmingham Box Active Traffic Management phases 1 and 2 scheme is the chosen policy option, following prioritisation under the TIF productivity funding.

**When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?** The costs and benefits of the Birmingham Box Active Traffic Management scheme will be monitored and reviewed through the design, implementation and construction of the scheme. The M42 Active Traffic Management Pilot 12 month report is available on the DfT website.

**Ministerial Sign-off** For consultation 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:



18th December 2008

## Summary: Analysis & Evidence

### Policy Option: Birmingham Box Active Traffic Management Phases 1 and 2

COSTS	<b>ANNUAL COSTS</b>		Description and scale of <b>key monetised costs</b> by 'main affected groups'
	<b>One-off</b> (Transition) <b>Yrs</b>		
	<b>£ 149m</b>		£149,022,555
	<b>Average Annual Cost</b> (excluding one-off)		
	<b>£ NA</b>		<b>Total Cost (PV)    £ 149m</b>
Other <b>key non-monetised costs</b> by 'main affected groups' NA			

BENEFITS	<b>ANNUAL BENEFITS</b>		Description and scale of <b>key monetised benefits</b> by 'main affected groups'
	<b>One-off</b> <b>Yrs</b>		
	<b>£ 399,250,000</b>		Net present Value of Benefits (PVB) (2011-2070) =      £399,250,000
	<b>Average Annual Benefit</b> (excluding one-off)		
	<b>£ NA</b>		<b>Total Benefit (PV)    £ 399,250,000</b>
Other <b>key non-monetised benefits</b> by 'main affected groups' These include establishing a sustainable balance between wider economic growth, social inclusion and environmental objectives. Also benefits to which the proposals could potentially benefit the economy as a whole, such as increasing the mobility of people or goods and supporting business activity.			

**Key Assumptions/Sensitivities/Risks** It is likely that the benefits listed above are conservative as they only take 15% accident reduction, exclude benefits for operation of Active Traffic Management outside the peak periods and no journey time reliability benefits have been included. It is expected that journey time reliability will improve as a result of the proposed Active Traffic Management scheme.

Price Base Year 2002	Time Period Years 60	<b>Net Benefit Range (NPV)</b> <b>£ N/A</b>	<b>NET BENEFIT (NPV Best estimate)</b> <b>£ 232.9m</b>
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What is the geographic coverage of the policy/option?		Birmingham Box	
On what date will the policy be implemented?		[ ] 2009	
Which organisation(s) will enforce the policy?		Regional Police	
What is the total annual cost of enforcement for these organisations?		£ TBA	
Does enforcement comply with Hampton principles?		Yes	
Will implementation go beyond minimum EU requirements?		No	
What is the value of the proposed offsetting measure per year?		£ NA	
What is the value of changes in greenhouse gas emissions?		£ NPV of £9,849,08	
Will the proposal have a significant impact on competition?		No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium      Large
Are any of these organisations exempt?	No	No	N/A      N/A

<b>Impact on Admin Burdens Baseline</b> (2005 Prices)		(Increase - Decrease)	
Increase of    £ NA	Decrease of    £ NA	<b>Net Impact</b>	£ NA

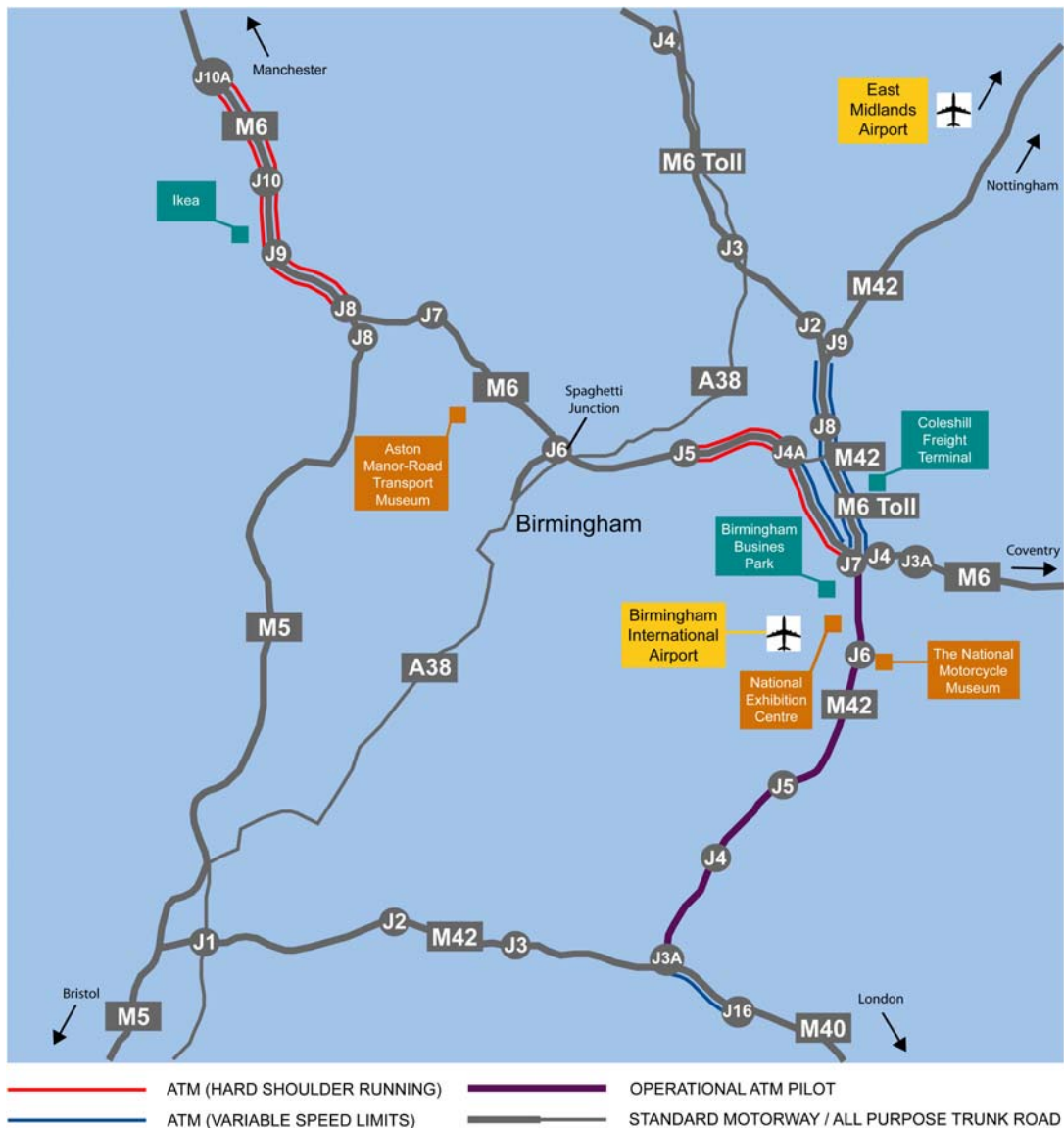
Key:      Annual costs and benefits: Constant Prices      (Net) Present Value

## Evidence Base (for summary sheets)

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

### Birmingham Box ATM Scheme Phase 1 and 2 - Introduction

The project covers the Phase 1 and 2 of the Productivity Transport Innovation Fund (TIF) scheme to implement Active Traffic Management on the Birmingham Box motorway network, to be undertaken by the Highways Agency. The project aims to deliver a combination of technologies on the Birmingham Box, building on the success of the M42 Active Traffic Management Pilot project, currently operational between Junctions 3A and 7. The Birmingham Box Active Traffic Management phases 1 and 2 scheme is illustrated on the Scheme Map below at Figure A:



**Figure A: Scheme Map**

The scheme will introduce traffic control and signalling to enable proactive management of the motorway network adjacent to the Birmingham conurbation.

Variable Mandatory Speed Limits will be used to smooth traffic flow and prevent stop-start conditions. In addition, dynamic use of the hard shoulder as a running lane, known as Hard Shoulder Running, will be implemented where appropriate.

## **Background**

The Government has undertaken a £6 billion investment programme to improve and make better use of motorways and other key roads. The Highways Agency is developing its role as Network Operator through a series of traffic management, network control and other measures with the aim of:

- Achieving best use of the existing road space
- Providing faster response to incidents and reducing clear-up times; and,
- Reducing levels of congestion and increasing the reliability of journey times.

Both Variable Mandatory Speed Limits and Hard Shoulder Running are key deliverables against these requirements, and are aimed at tackling congestion through the introduction of new technology and innovative solutions to make best use of the existing road space.

## **Business Need**

Active Traffic Management around the Birmingham Motorway Box commenced with an initial Feasibility Study and outline business case produced in 2006, as part of identifying schemes to relieve the heavily congested motorways around the city of Birmingham. This work provided the basis for an initial bid for funding such a project, from the Transport Innovation Funding (TIF) for productivity.

The concept of Active Traffic Management has been established from the M42 J3A to 7 Pilot project, which has provided additional congestion relief benefits without the need for widening or land take and has provided the tools for the Highways Agency to undertake the Network Operator Role.

The West Midlands Area Multi-Modal Study (WMAMMS) Report (dated October 2001) recommended the introduction of Active Traffic Management on the M5, M6 and M42 motorways around the West Midlands conurbation. The Highways Agency then commissioned a feasibility study into this proposal from Atkins, which was completed in May 2002.

By implementing this project the issues and problems affecting the Birmingham Box will be addressed. The links proposed for an Active Traffic Management solution are already classified as in either the top 10% or top 20% of the worst congested areas on the network and action was required to improve and maintain traffic flows, and hence productivity, in the area.

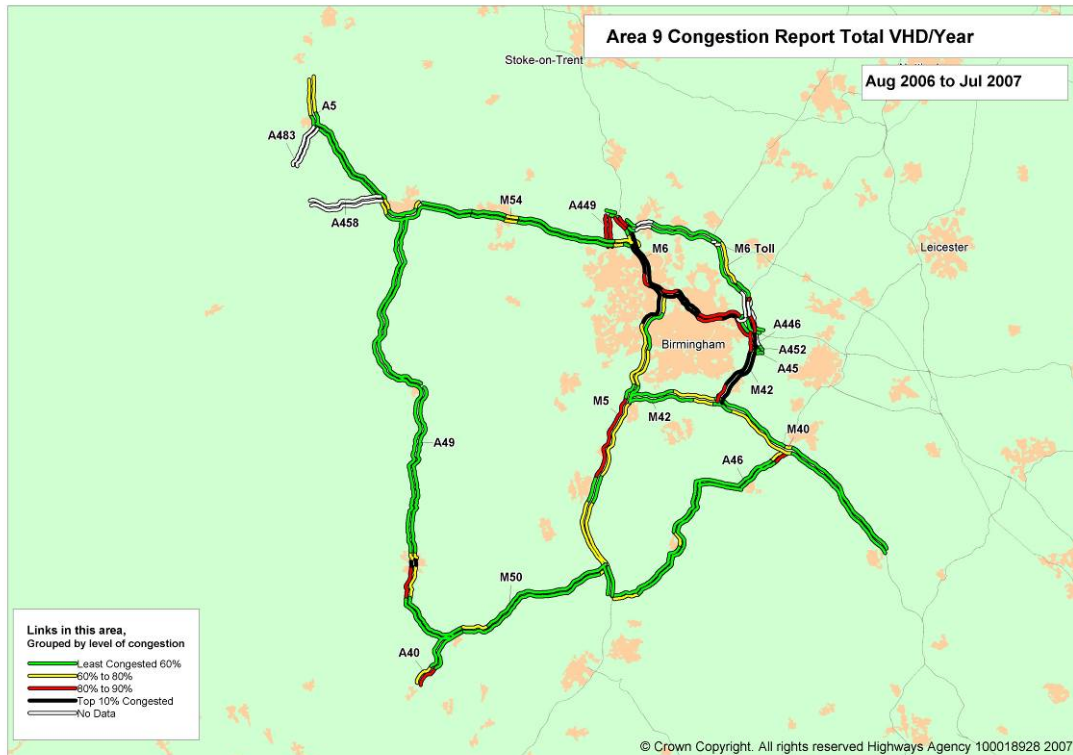
In the response to WMAMMS (dated July 2003), the Secretary of State asked the Highways Agency to consider the feasibility of implementing Active Traffic Management techniques around the West Midlands Motorway Box.

The Highways Agency then commissioned AmeyMouchel, the Managing Agent Contractor (MAC) for this area of the network, to review and update the original feasibility study report, taking into account experience gained so far from the M42 Active Traffic Management Pilot scheme.

This indicated that, in general, the whole of the Birmingham Box would benefit from Active Traffic Management, with M6 Junctions 4-10A warranting the highest priority, and the M42 Junctions 3A-M5 the lowest priority.

The 2006/07 Area 9 congestion report (see Figure B below), showing total annual vehicle hour delay, highlights the severity of congestion around the Birmingham Box and the need for the network wide improvements offered by the Active Traffic Management Phase 1 and 2 schemes. Long term strategic evidence has been collected to support the case, starting with the West Midlands Area Multi-Modal

Study in 2001 and building on this and the outcome of the M42 Active Traffic Management Pilot to develop the productivity scheme proposals.



**Figure B – Area 9 Congestion Map, August 2006 to July 2007**

### **Alternatives Options Considered**

Since the West Midlands Area Multi-Modal Study was issued in 2001, significant work has been undertaken by various parties to determine suitable Operational Regimes for implementation around the Birmingham Box, and where the priorities lie. Three reports were produced in 2006 by AmeyMouchel entitled Operational Review (344429/DOC/011), Economic Review (344429/DOC/012) and Scoping Review (344429/DOC/012). These documents considered the whole of the Birmingham Box and identified the key areas where improvements to the network were required, considered different options and made recommendations as to the best value for money solutions.

In August / September 2006 Mott MacDonald produced a Preliminary Business Case for the provision of Active Traffic Management around the Birmingham Box, providing a Benefit Cost Ratio (BCR) of between 2.7 and 3.3. The outcome of this work led to the current productivity TIF for Phase 1 and 2 of the scheme and a refreshed Outline Business Case was produced (September 2007) covering only these sections. The BCR was 4.018 excluding wider economic benefits and including Accident benefits (Design Consultant (Mouchel) Business Case ref: 718217/WS03/S01-3/DOC/002) and after consideration of non-monetised impacts the scheme was assessed as offering high value.

Operational reviews have been undertaken on each scheme section, and operational regimes have been recommended for each section. For each link the following options were considered:

- Active Traffic Management (use of the hard shoulder during busy periods);
- Controlled Motorways; and
- Do nothing.

The locations and preferred options (Operational Regimes) within each phase have been determined through a detailed operational review by the Design Consultant (Mouchel) and are shown in Table A.

Phase	Motorway	Extent	Carriageway	Feature
1	M40	M40 J16 –	Northbound	Variable Mandatory Speed Limits
		M42 J3A (north)		
	M42	J7 – 9	Northbound	Variable Mandatory Speed Limits
		J9 – 7	Southbound	Variable Mandatory Speed Limits
	M6	J4 – 5	Northbound	Variable Mandatory Speed Limits and Hard Shoulder Running
		J4A – 4	Southbound	Variable Mandatory Speed Limits
J5 – 4A		Southbound	Variable Mandatory Speed Limits and Hard Shoulder Running	
2	M6	J8 -10A	Northbound	Variable Mandatory Speed Limits and Hard Shoulder Running
		J10A – 8	Southbound	Variable Mandatory Speed Limits and Hard Shoulder Running

**Table A: Proposed Features for Phase 1 and 2 Schemes**

### **Policy Objectives**

The Highways Agency proposes to use Hard Shoulder Running and Variable Mandatory Speed Limits on strategic areas of the motorway network adjacent to the Birmingham conurbation.

The Birmingham Box Active Traffic Management phases 1 and 2 scheme will:

- Reduce congestion, thereby increasing mobility of people and goods;
- Reduce the impact of accidents;
- Have a globally neutral environmental impact; and
- Improve driver comfort.

In addition, the project will:

- Support agglomeration of business activity;
- Support the mobility and flexibility of the labour market;
- Increase international competitiveness and trade through improving ease of movement of goods and services; and
- Increase network resilience and choice for business users;
- Increase accessibility to other businesses – allowing them to share knowledge and operations and offer accessibility to a larger pool of workers.

## **Scheme Development**

The first stage in the development of this scheme has been to establish the candidate Operational Regimes for implementation on Phases 1 and 2, including consideration of:

- Integrated Incident Management;
- Improved real time information;
- Use of Variable Mandatory Speed Limits;
- Use of signs and signals to open and close lanes to manage incidents and maintenance;
- Use of the Hard Shoulder to assist in the management of:
  - congestion
  - maintenance
  - exit stacking
  - marshalling traffic by destination

The M42 Active Traffic Management Pilot scheme has been successfully operating since 2005, with 4 lane-operation active from September 2006. The Birmingham Box Active Traffic Management phases 1 and 2 scheme builds on the experience and successes of the Pilot. The following key changes and additions to the Pilot are proposed:

- Under Active Traffic Management, gantry and emergency refuge area spacing will be nominally 800m as opposed to the 500m used on the Pilot;
- Through Junction Running will operate where required; and
- Traffic on the hard shoulder will be subject to a 60mph speed limit, as opposed to the 50mph restriction applied to traffic in the Pilot area.

A generic safety case for Hard Shoulder Running at 60mph has been produced through Highways Agency NetServ and approved in principle by Highways Agency Directors. This has shown that Hard Shoulder Running with a maximum speed limit of 60mph can be implemented without significant adverse impact on the overall risk of the scheme. As part of the development of the Pilot scheme, Hard Shoulder Running at 60mph is being trialled on the M42 between Junctions 3A and 7, to assess its operability in practice prior to implementation on the Birmingham Box Active Traffic Management phases 1 and 2 scheme.

Similarly, generic 'Through Junction Running' designs have been produced, demonstrating the feasibility and practicality of the concept. The impact of Through Junction Running will vary significantly according to the geometry of the junction and each proposed location was reviewed on a site specific basis at the detailed design stage. Through Junction Running will be implemented at M6 Junction 4A and M6 Junction 10.

The Safety Case for the scheme has demonstrated that it will be acceptably safe at its introduction and also that the level of safety can be maintained throughout the operational life of the project. The preliminary safety hazard review has been undertaken and analysis to date has given an indication that the project will be Globally At Least Equivalent (GALE). This means that the project is expected to at least maintain the current level of safety delivered by the safety baseline.

Work has been completed to examine traffic and operational conditions on the Birmingham Box to determine the optimum locations and extent of each regime.

## **Costs**

The costs for each element of the scheme are detailed below. The figures have been prepared using the Project Appraisal Report (PAR) process. Whilst recognising the PAR is normally used for schemes less than £5m, it provided a good structure to develop the business case for this project.

### ***Cost Breakdown***

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

Design Fees / Supervision =	£15,130,938
Ancillary Works =	£23,912,555
Construction Works =	£76,091,643
Inflation =	£12,184,256
Risk =	£17,362,700
Optimism Bias @ 3% =	£4,340,463
<b>Total =</b>	<b>£149,022,555</b>

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

Consumer User Benefits =	£132,108,000
Business User Benefits =	£211,610,000
Private Sector Provider Impacts =	£-8,074,000
Carbon Benefits =	£-3,428,000
Accident Benefits =	£67,034,000
<b>Net present Value of Benefits (PVB) =</b>	<b>£399,250,000</b>
(All Benefits at 2002 prices)	

Further information on the key monetised benefits can be found within the scheme Assessment Summary Table.

### ***Key non-monetised benefits by 'main affected groups'***

The expansion of Active Traffic Management will contribute to:

- Reducing congestion;
- Providing more reliable journey times;
- Reducing the impact of accidents/incidents;
- Increasing information for the driver;
- Maintaining current safety levels; and
- Reducing driver stress.

It is recognised that there needs to be a sustainable balance between wider economic growth, social inclusion and environmental objectives and the extent to which proposals could potentially benefit the economy as a whole, such as:

- (a) Increase the mobility of people or goods in a way that reduces business costs;
- (b) Support agglomeration of business activity;
- (c) Support the mobility and flexibility of the labour market;
- (d) Increase international competitiveness and trade through improving ease of movement of goods and services;
- (e) Increase network resilience and choice for business users.
- (f) Increased the accessibility to other firms – allowing them to share knowledge and operations.
- (g) Firms being accessible to a larger pool of workers.

### **Business Case**

The Business Case methodology for the scheme was issued and agreed with the Highways Agency. All financial information was input to the HA Project Appraisal Report (PAR) which assesses the project as a whole, including consideration of all economic and environmental impacts of the scheme. The Business Case output demonstrated that the scheme is robust in economic terms and represents good value for money. The Benefit Cost Ratio (BCR), including accident benefits, is 4.018. The value for money assessment has also considered other wider economic benefits which raises the BCR to 4.625.

The high BCR combined with wider economic and productivity benefits judge this to be a high value for money scheme.

Further information on the Business Case output can be made available if required. In appraising the scheme from both an environmental and all round basis a NATA (New Approach to Appraisal) approach has been adopted using the latest WebTag guidance (<http://www.webtag.org.uk/>). A Full Project Appraisal Report (PAR v4.1c) and Assessment Summary Table (AST) has been produced along with supporting worksheets. These have been reviewed and agreed with HA Specialists.

## **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 and Hard Shoulder Running will reduce travel times and improve journey reliability which will contribute positively to competition in the marketplace. There will be agglomeration and 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 (BERR) 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.

### ***Legal Aid***

The Department for Constitutional Affairs (DCA) 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 Birmingham Box Active Traffic Management phases 1 and 2 scheme. Therefore, a full Legal Aid impact test is not required.

### ***Sustainable Development***

The Governments 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 Governments carbon assessment guidelines have been followed in order to assess the impact of the proposed scheme upon carbon emissions.

The Active Traffic Management pilot scheme has demonstrated 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 (HA) national and local environmental strategies and policies including:

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

### ***Health Impact Assessment***

The Department of Health (DH) 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 (DRC) 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 Equalities Office guidelines have been followed in order to assess the impact of the proposed scheme upon gender equality.

A full gender equality 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 (CRC) 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 annexed.**

Type of testing undertaken	<i>Results in Evidence Base?</i>	<i>Results annexed?</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

## Annexes

### References

- Highways Agency, *Productivity TIF Phase I and II - Impact on the Economy*.
- Highways Agency, *4-Lane Variable Mandatory Speed Limits - 12 Month Report (Primary and Secondary Indicators)*.
- Highways Agency, *Area 9 Congestion Report*.
- Office of Fair Trading, *Completing Competition Assessments in Impact Assessments - Guideline for Policy Makers*.
- Department for Business Enterprise & Regulatory Reform, *Small Firms Impact Test – Guidance for Policy Makers*.
- European Commission, *Trans-European Transport Network (2020 Horizon)*
- Design Consultant (Mouchel), *Outline Business Case September 2007 Ref: 718217/WS03/S01-3/DOC/002*.
- Highways Agency, *HIB Board Paper - TIF Productivity Bid – Birmingham Box ACTIVE TRAFFIC MANAGEMENT (Phases 1 and 2)*.
- Highways Agency, *Project Initiation Document (PID) - TIF Productivity Bid Birmingham Box ACTIVE TRAFFIC MANAGEMENT (Phases 1 and 2)*.
- Highways Agency, *Full Project Appraisal Report (PAR), including Assessment Summary Tables*.
- Highways Agency, *Towards a Balance with Nature: The Highways Agency Environment Strategic Plan*.
- Highways Agency, *Living with Roads: An Environmental Strategy for England's Main Roads*.