

LNMS Evaluation Report

M6 J32 Southbound Widening



June 2011

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Glossary of Terms

Term	Abbreviation	Description
Accessibility	-	Accessibility can be defined as 'ease of reaching'. The accessibility objective is concerned with increasing the ability with which people in different locations, and with differing availability of transport, can reach different types of facility.
Annual Average Daily Traffic	AADT	The 24hr total traffic flow for the average day of the year
Appraisal Summary Table	AST	This records the impacts of the scheme according to the Government's five key objects for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG
Automatic Traffic Count	ATC	An automated method of recording the volume (and sometimes classification) of vehicles passing a particular point on a road.
Average Daily Traffic	ADT	The 24hr total traffic flow on an average day over a certain time period (Monday – Sunday)
Average Weekday Traffic	AWT	The 24hr total traffic flow on an average weekday over a certain time period (Monday – Friday)
Benefit Cost Ratio	BCR	Benefit Cost Ratio is a ratio identifying the relationship between cost and benefits of a proposed project.
Bank Holiday Monday	BHM	UK Public Holidays that fall on a Monday.
Capitalisation	-	The process by which benefits for a scheme are factored to give an estimate for the appropriate appraisal period.
Chi-Square	-	A statistical test to determine whether the observed values of a variable are significantly different from those expected on the basis of a null hypothesis. Variables are categorised to determine whether a distribution of scores is due to chance or experimental factors and tests whether one variable is independent of another.
Design Build Finance and Operate	DBFO	The Design, Build, Finance and Operate (DBFO) Project is part of the Government's Public Private Partnership initiative. The aim is to forge closer co-operation between the public and private sectors and introduce private sector skills and disciplines into the management of projects and services traditionally undertaken by the public sector. By applying this to the trunk road network the Highways Agency is seeking to improve highways maintenance and obtain better value for money in the delivery of large improvement schemes.

Term	Abbreviation	Description
Department for Transport	DfT	A Government department whose objective is to oversee the delivery of a reliable, safe and secure transport system that responds efficiently to the needs of individuals and business whilst safeguarding our environment. The Highways Agency is an executive of the DfT .
Discounting	-	A technique used to compare costs and benefits that occur in different time periods and is the process of adjusting future cash flows to their present values to reflect the time value of money, e.g. £1 worth of benefits now is worth more than £1 in the future. A standard base year needs to be used which is 2002 for the appraisal used in this report.
Dis-benefit	-	A negative benefit or something that detracts from the performance.
Evaluation Summary Table	EST	In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST .
First Year Rate of Return	FYRR	First Year Rate of Return is the ratio of money gained on an investment relative to the amount of money invested.
Highways Agency	HA	An Executive Agency of the Department for Transport (DfT), responsible for operating, maintaining and improving the strategic road network in England.
Killed or Seriously Injured	KSI	A term used to describe the number of people killed or seriously injured as a result of PIAs .
Journey Time Database	JTDB	A Highways Agency database of average vehicle journey times on the trunk road network
Local Network Management Scheme	LNMS	LNMS are improvement schemes whose total overall estimated cost (including design, land, works, supervision, risk and VAT) is less than £10 million. They are categorised by the Government under Safety, Economy, Accessibility, Integration and Environment.
Managing Agent Contractor	MAC	Responsible for the operation, maintenance, and improvement of the motorway and trunk road network of a Highways Agency area.
New Approach to Appraisal	NATA	Used for transport scheme appraisal since 1998
Non Motorised User	NMU	Includes pedestrians, cyclists, horse riders and disabled people, whose needs must be addressed. An NMU audit considers the specific needs of these road users.

Term	Abbreviation	Description
Optimism Bias	-	Is a demonstrated systematic, tendency for project appraisers to be overly optimistic, and in effect, results in an underestimation of scheme costs. The base cost estimate is adjusted to account for optimism bias in order to obtain more accurate cost estimates.
Project Appraisal Report	PAR	A key document summarising the need for a project, plus its costs and benefits (including those that cannot be quantified in monetary terms).
Personal Injury Accident	PIA	A term commonly used to refer to road accidents
Post-Opening Project Evaluation	POPE	Before & after monitoring of all highway schemes in England.
Public Right of Way	PRoW	Public Rights of Way are highways that allow the public a legal right of passage
Professional Services Framework	PSF	Frameworks provide better value for money compared with the procurement on an individual project basis. They allow long-term relationships to be developed which allow better programming of work and planning of resources.
Present Value of Costs	PVC	Present Value of Costs is a term used in cost-benefit analysis and project appraisal that refers to the discounted sum, or Present Value, of a stream of costs associated with a project or proposal.
Risk Allowance	-	Risk refers to identifiable future situations that could result in an over spend or under spend occurring. The base cost estimate is adjusted to account for risk in order to obtain more accurate cost estimates.
Severance	-	Community severance is the separation of adjacent areas by road or heavy traffic, causing negative impact on non-motorised users, particularly pedestrians.
-	STATS19	A database of injury accident statistics recorded by police officers attending accidents.
Traffic Database System	TRADS	Traffic count database developed by the Highways Agency, to hold data from the countries traffic monitoring sites.

1. Introduction

- 1.1 This report is the post-opening project evaluation (POPE) of the M6 J32 Southbound Widening Local Network Management Scheme (LNMS).

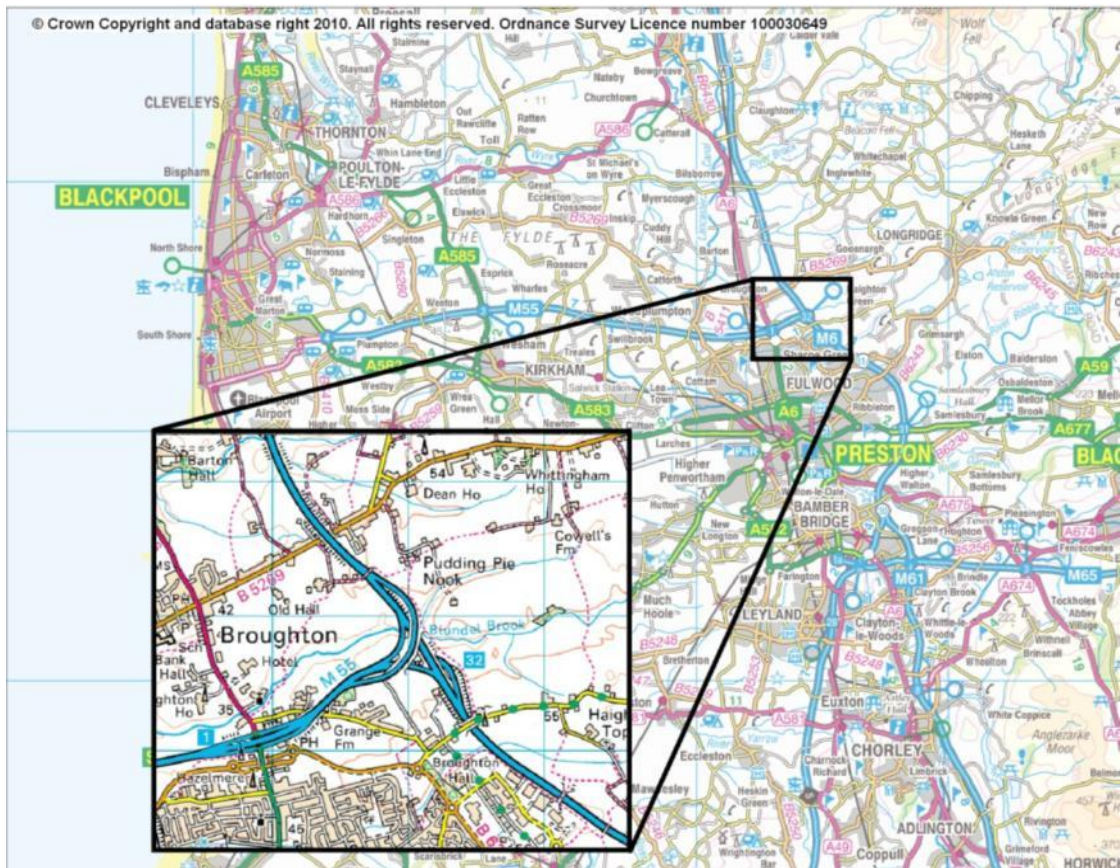
Background to Scheme

- 1.2 This scheme was developed to improve the journey times on the M6 southbound around J32 by widening the through-junction M6 from two lanes to three and adjusting the diverge and merge points. The PAR states that the problem with delays at this location was particularly severe during the Sunday peak period, when it is thought that queues were at their worst.
- 1.3 The scheme also aims to reduce accidents along this stretch by providing advanced direction signing on gantries on the approach to the junction.
- 1.4 There was a second scheme, with PAR reference D204887, which also included the provision of gantry signs on the approach to the junction. It is believed that this 'second' scheme's measures are entirely encompassed within the M6 J32 Southbound Widening scheme and thus can be ignored.

Scheme Location

- 1.5 The M6 J32 is situated just north of Preston, where it provides access to the M55 towards Blackpool, routes north to Lancaster, Cumbria and Scotland, and routes south to the Midlands as well as Manchester via the M61.
- 1.6 The junction is part of a key corridor of movements between motorways. Within a 10 mile stretch of the M6 there are junctions with the M55, M61 and M65.
- 1.7 The scheme falls within Highways Agency Area 13 which is currently managed by Amey Mouchel. The scheme location in relation to its surroundings is shown in Figure 1.1.

Figure 1.1 – Scheme Location



Scheme History

- 1.8 Prior to the scheme, the PAR reports heavy delays on the M6 southbound carriageways, typically during the Sunday peak period. It is claimed that the queuing during the tourist season 'regularly exceeds 30 miles' and so causes substantial delay.
- 1.9 The combination of this queuing behaviour and the previous diverge/merge layout has also been identified as a source of a high frequency of shunt type accidents along this section of road.
- 1.10 The scheme was fully completed on 12th June 2009.

Scheme Categorisation

- 1.11 Each Local Network Management Scheme (LNMS) is assigned a category according to which of the NATA objectives it is primarily focused on delivering against. This is outlined in the PAR for the scheme. For the M6 J32 Southbound Widening the scheme is outlined as an economy scheme.
- 1.12 Therefore, the scheme's primary purpose is to reduce journey times and improve transport economic efficiency. However, as with most schemes, there are other secondary benefits to this scheme, primarily road safety.
- 1.13 The forecast cost of the scheme (£3.2m) means that the scheme has been classified as a 'Large' LNMS, which is anything costing between £1m and £10m. This means that the POPE evaluation is carried out to a greater depth of analysis than the smaller schemes in the LNMS programme.

Scheme Objectives

1.14 The PAR states the objectives of the schemes as:

- Eliminate queuing and congestion on the southbound approach to J32; and
- Reduce accidents related to congestion and those related to movements at J32.

Purpose of this Report

Post-Opening Project Evaluation

1.15 As part of an ongoing programme, whereby the Highways Agency (HA) evaluates the impacts of trunk road schemes, Atkins are commissioned to undertake post-opening evaluations of Local Network Management Schemes (LNMS) with an implementation cost of between £25k and £10m. The aim of this process is to:

- Quantify the outturn benefits, dis-benefits and costs accruing from new schemes and to ascertain which schemes offer the greatest value for money;
- Develop the pre-scheme appraisal processes (PAR Guidance) and ensure that accurate predictions are made about the possible impacts of highway schemes on safety, economy, environment, accessibility and integration in the future;
- Enable the HA to select schemes that offer the greatest value for money and that are the most effective solutions to problems on the trunk road network; and
- Make recommendations for the appraisal process in particular to facilitate and increase the accuracy of future PAR appraisals for schemes similar to that implemented in each evaluation.

1.16 This report specifically sets out the results of the Post-Opening Project Evaluation (POPE) of the M6 J32 Southbound Widening scheme. More specifically, this report examines the economic and safety impacts resulting from the improvements, with consideration also given to the main environmental, accessibility and integration impacts.

POPE Methodology Overview

1.17 This evaluation report presents the forecast and outturn impacts of the M6 J32 Southbound Widening scheme in accordance with the POPE methodology. POPE is based on an evaluation of the scheme's outturn impacts against the five core New Approach to Appraisal (NATA) objectives as listed below:

- **Economy** – concerned with improving the economic efficiency of transport, for example, journey time savings and reliability;
- **Safety** – concerned with reducing the loss of life, injuries and damage to property resulting from transport incidents and crime;
- **Environment** – reducing the direct and indirect impacts of transport facilities on the physical and social environment of both users and non-users;
- **Accessibility** – concerned with the ability with which people can reach different locations and facilities by different modes; and
- **Integration** – aims to ensure that all decisions are taken in the context of the Government's integrated transport policy.

1.18 Furthermore, this report presents the following:

- A comparison of the 'before' and 'after' traffic volumes and journey times along the scheme extent to illustrate how overall traffic conditions have changed following scheme opening;

- An outline of changes in the number of accidents and accident rates at the junction following scheme opening;
- A comparison of predicted and outturn environment, accessibility and integration impacts;
- A summary of scheme performance from the perspective of key stakeholders engaged in the original scheme development, including the Highways Agency Project Manager;
- The PAR assessment which forecast the benefits of the scheme. Where required, values are converted to 2002 prices and discounted to 2002; and
- An Evaluation Summary Table (EST) based on the outturn effects of the scheme using a methodology consistent with the PAR assessment undertaken prior to the scheme opening.

Structure of this Report

1.19 Following on from this introduction, this report includes:

- **Section 2 – Scheme Detail:** Provides details of the scheme including photos illustrating the scheme key features;
- **Section 3 – Data Collection and Stakeholder Feedback:** Contains an outline of the data which has informed the evaluation and the responses from key stakeholders regarding the scheme;
- **Section 4 – Traffic Impacts:** Outlines the traffic changes in the study area and the impact on journey times;
- **Section 5 – Safety Impacts:** Outlines the safety impacts of the scheme through analysis of personal injury accidents;
- **Section 6 – Economy:** Outlines the economic impacts of the scheme in respect to predicted and outturn works costs, traffic volume changes and journey delay analysis;
- **Section 7 – Environmental, Accessibility and Integration Issues:** Summarises the scheme impacts on these issues; and
- **Section 8 – Summary of Conclusions and Recommendations:** Summarises the impact of the scheme based on the data available to evaluate the scheme.

1.20 It is intended that the findings from this report will feed into a wider summary of the outcomes of POPE. This is a document (namely the LNMS Annual Evaluation Report) produced in the 3rd quarter of each year outlining the key messages from the whole POPE of LNMS process.

2. Scheme Detail

- 2.1 This section of the report informs of the details of the M6 J32 Southbound Widening scheme and examines the pre-scheme and post-scheme conditions. The northbound M6 was unchanged by this scheme.

Pre-Scheme Layout

- 2.2 Prior to the scheme, the M6 southbound was 3 lanes wide from J33 in a southbound direction. At J32, the diverge to the M55; there was a lane drop where the left-hand lane dropped off the M6 to fly over the M6, forming part of the M55 westbound.
- 2.3 This meant that the M6 mainline southbound within J32 was reduced to 2 lanes for approximately 0.8 miles prior to the merge with the M55 eastbound.
- 2.4 At the merge with the M55, the 2 lanes M6 southbound were joined by 2 lanes from the M55 eastbound, increasing the number of lanes to 4. Therefore there is no merge, rather a lane gain of two lanes southbound. These 4 lanes continue south over the critical section of M6 between the M55 (J32) and the M61 (at J30).
- 2.5 The pre-scheme layout is shown in Figure 2.1 and Figure 2.2. A diagram of the scheme layout is also shown in Figure 2.3.

Figure 2.1 – Pre-scheme M6 SB, M55 WB diverge (view north from M55 flyover)



Figure 2.2 – Pre-scheme M55 EB, M6 SB Merge (view south from M55)



Figure 2.3 – Scheme Layout



Post-Scheme Layout

- 2.6 The implementation of this scheme involved a number of changes over this section.
- 2.7 Moving southbound from J33 on the M6, there are 3 lanes as before. New gantry signs providing lane and advanced direction signing information have been installed at one third mile intervals on the approach to J32 (see Figure 2.4).
- 2.8 However, rather than dropping a lane at the M55 westbound diverge, the 3 lanes continue southbound through the junction; with those travelling on the M55 filtering off the M6 (see Figure 2.6) in a traditional off-slip layout.
- 2.9 The merge between the M55 eastbound and M6 southbound is altered. There remain two lanes approaching from the M55, but rather than add to the lanes on the M6, they split along a ghost island. The outside of the two lanes merges with the M6 whilst the inside lane of the M55 adds to the three lanes of the M6 southbound following the ghost island (as shown in Figure 2.5).
- 2.10 This then leaves 4 lanes on the M6 southbound to continue, as before the scheme, down to the M61 junction.
- 2.11 The scheme layout is shown with post-scheme photographs in Figures 2.4-2.6, but also diagrammatically in Figure 2.3

Figure 2.4 – Example of new gantry signing on approach to Junction 32



Figure 2.5 – New merge from M55, as viewed from on-slip



Figure 2.6 – New J32 SB diverge and 3 lane through junction layout



Scheme Features

- 2.12 Other than the layout changes described and compared above, the scheme also attempted to reduce lane change type accidents through advanced gantry signing.
- 2.13 Gantry signing was added north of the M55 diverge to ensure that southbound drivers could be alerted to correct lane discipline in advance of the merge. A photograph of the new gantry signing is shown in Figure 2.6.

Site Visit

2.14 A site visit was conducted on 19th April 2011 to help understand the scheme measures, see traffic interact with the scheme and ensure the scheme is in place as specified in the PAR.

2.15 On site observations include:

- Traffic was complying with the new layout well;
- On the day visited, no noticeable delays caused by the new merge/diverge arrangements;
- All scheme measures in place as described in the PAR; and
- New gantry signs erected and easy to follow and interpret.

Summary

The scheme appears to have been implemented as per the proposals set out in the PAR. The traffic appears to be using the scheme as expected when observed during the site visit.

3. Data Collection and Stakeholder Feedback

3.1 This section outlines the sources of data used to undertake this evaluation. Specifically, this is split into:

- A list of the sources of data used to analyse the scheme; and
- A summary of feedback from the MAC (Managing Agent Contractor), Project Manager and any other parties interested in the effects of the scheme.

Data Sources

3.2 The following data was obtained to conduct this evaluation:

Pre-Scheme Data

- The scheme Project Appraisal Report (PAR) – Amey Mouchel, January 2009;
- M6 VISSIM J32 Improvement Scheme Report – JMP, July 2007;
- Journey Time Survey Data – Count on Us;
- Environmental Survey – Amey Mouchel, July 2008 and March 2008;
- Record of Determination (ROD) – Amey Mouchel, October 2008;
- Scheme Consultation Plans – Amey Mouchel, April 2008;
- Accident data for 2 miles north and south of M6 J32. Further, accident data for the M55 from J1 to the M6 merge. Accident data collected for January 2003 to October 2008; and
- Data from permanent Automatic Traffic Count (ATC) sites on the M6 and M55 from the Highways Agency (HA) TRADS database.

Post-Scheme Data

- Data from permanent Automatic Traffic Count (ATC) sites on the M6 and M55 from the Highways Agency (HA) TRADS database;
- Data from the HA's Journey Time Database (JTDB) for the M55 and M6 to inform of pre- and post-scheme journey times; and
- Accident data for 2 miles north and south of M6 J32. Further, accident data for the M55 from J1 to the M6 merge. Accident data collected for June 2009 to June 2010.

Stakeholder Feedback

3.3 To help understand the impact of the scheme from the opinion of those who planned and implemented it, consultation has been undertaken. No feedback has been received regarding the performance of this scheme.

4. Traffic Impacts

4.1 This section of the report considers the impact on traffic since the introduction of the M6 J32 Southbound Widening scheme. This includes changes directly attributable to the scheme in addition to background traffic impacts. In particular, this section will consider the impact on:

- Traffic Volume; and
- Key Journey Times.

Traffic Volume

4.2 It is important to understand how traffic volume has changed since the implementation of the scheme to provide context to the scheme's performance. For example, if journey times have improved while traffic levels have decreased, it is likely that the journey time improvement is at least partially due to less congestion on the route rather than the scheme.

4.3 Equally, considering traffic volume and patterns in traffic volume is critical to understanding how the period of time in which this evaluation is based is representative of the route throughout the year.

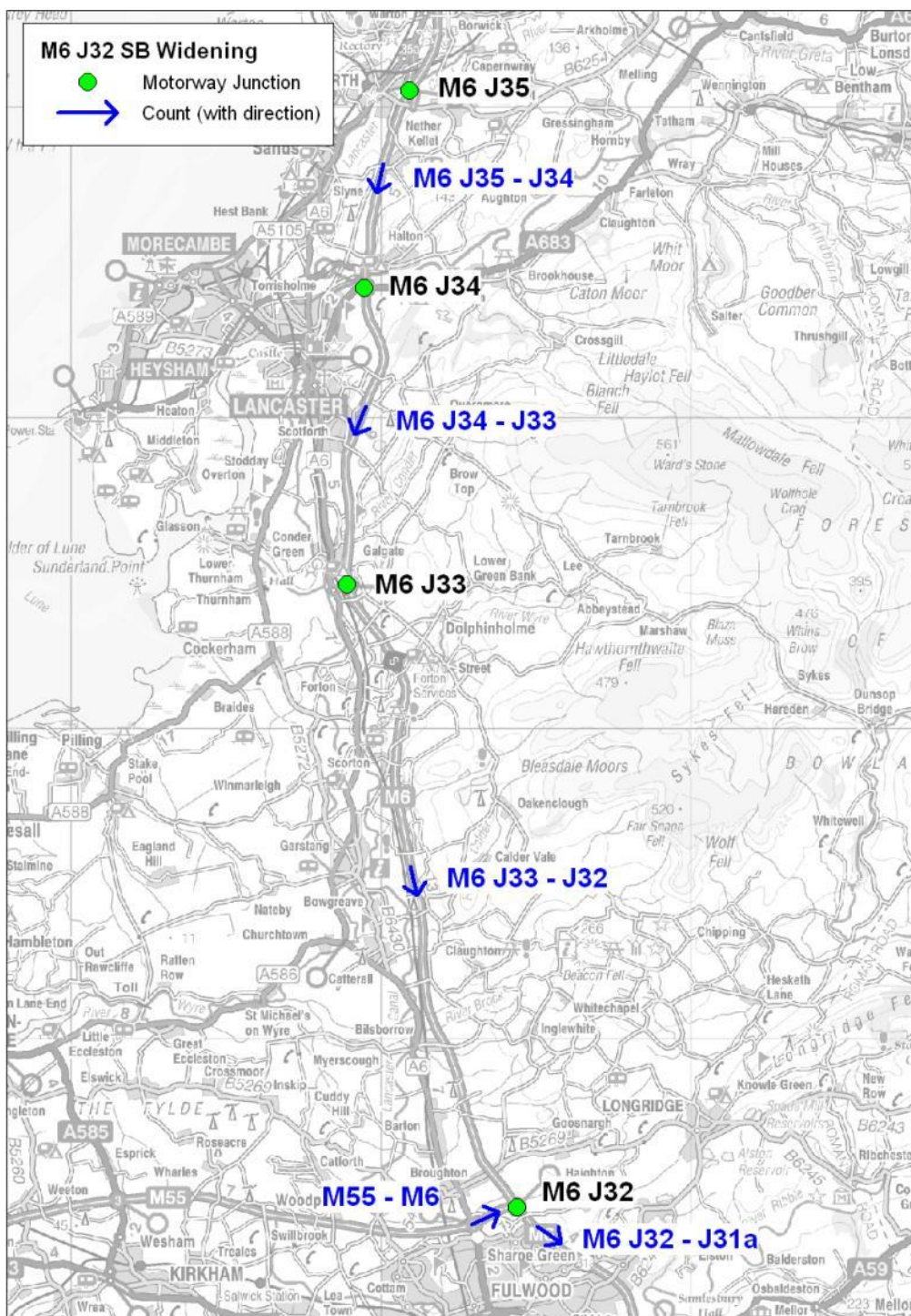
4.4 For these reasons, the traffic volume analysis provides a critical backdrop to this evaluation.

Traffic Trends

4.5 Long term traffic count data is available for the M6 and M55 around J32 which can provide an understanding of the flow trends on this route. This data is from the Traffic Information Database (TRADS) which contains count data from the trunk road network and is provided by the HA.

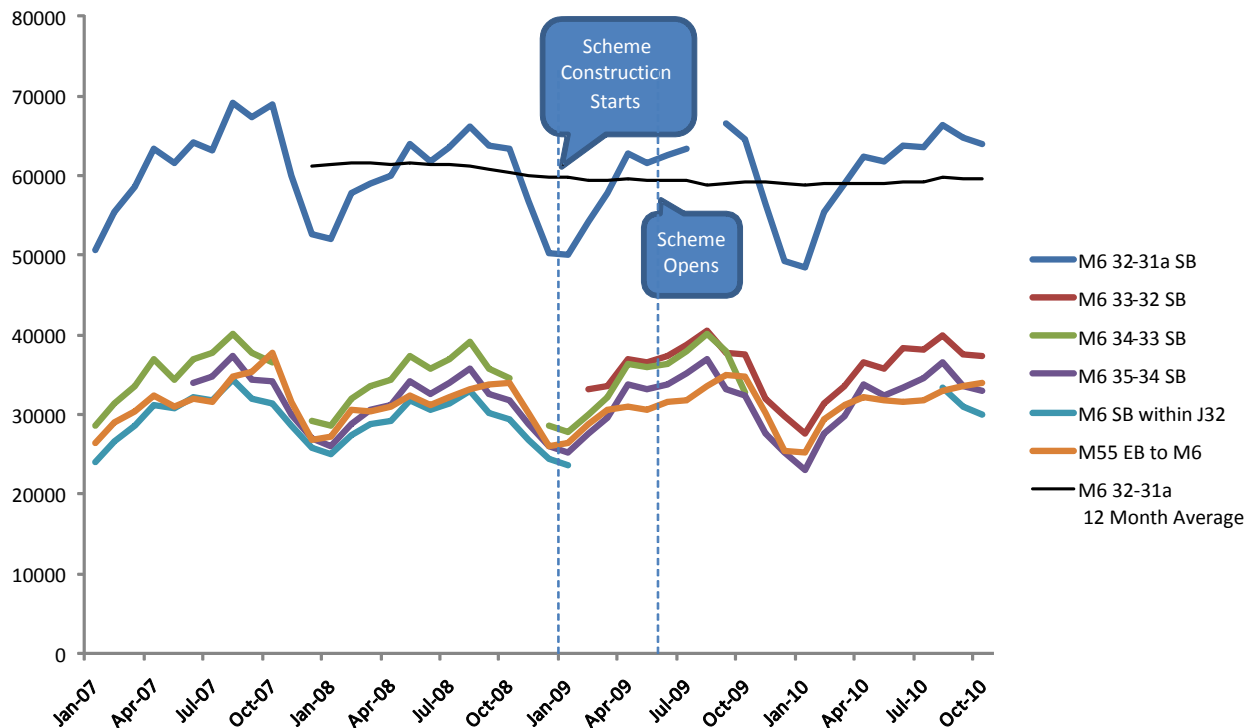
4.6 The locations of these counts are shown in Figure 4.1 overleaf. The arrows indicate the direction of the counts relevant to this scheme.

Figure 4.1 – TRADS Count Locations



4.7 The monthly ADTs (Average Daily Traffic flows) on these links between 2007 and 2010 are shown graphically in Figure 4.2. Unfortunately, the data for some of these links is not consistently available for the whole time period and so there are some gaps in the data. However, the general trends of the links are easy to observe and remain informative.

Figure 4.2 – Southbound ADT from 2007 to 2010 on Key Links



4.8 The graph demonstrates that the trend on each of these roads over the year is very similar and highly seasonal. Each year there is an increase in traffic between April and November, typically reaching a peak in August. This is consistent with the summer holiday season and is the expected seasonality for these roads that serve tourist destinations. Further, the extended high level of traffic until November falls in line with the Blackpool Illumination scheduling (which tends to draw tourists/sightseers to the area).

4.9 A trend line has been added to the M6 J32-31a southbound count to help identify the underlying trend over time. This is a rolling, 12 month trend line to ensure that monthly variations don't influence the underlying trend. The line shows the highest traffic levels were in 2008, followed by a dip in 2009, then a small amount of growth again in 2010. The reduction in traffic volumes through early 2009 coincides with the construction period between January and June 2009. The subsequent slight growth coincides with scheme opening. It should be noted that the M6 J32-31a section has a much higher ADT than the other roads on the graph because the M55 and M6 merge onto this section of road.

4.10 Figure 4.2 also shows that traffic levels on the M55 are similar to those on the M6 north of the scheme, which leads to the doubling of traffic volume to the south of the scheme.

4.11 Table 4.1 provides the Annual Average Daily Traffic (AADT) flow in each of the years considered for the M6 J32-31a. This re-enforces the message from the trend line, but also confirms that traffic levels have not yet reached 2007 levels since the scheme opened. This is likely due to the economic recession that has caused traffic levels to reduce across the country during this time. While the data is not available for the full 4 years for J33-32, it is likely the pattern is the same for this road stretch given how similar the trends are for these road sections in Figure 4.2.

Table 4.1 – Annual Average Daily Traffic by year

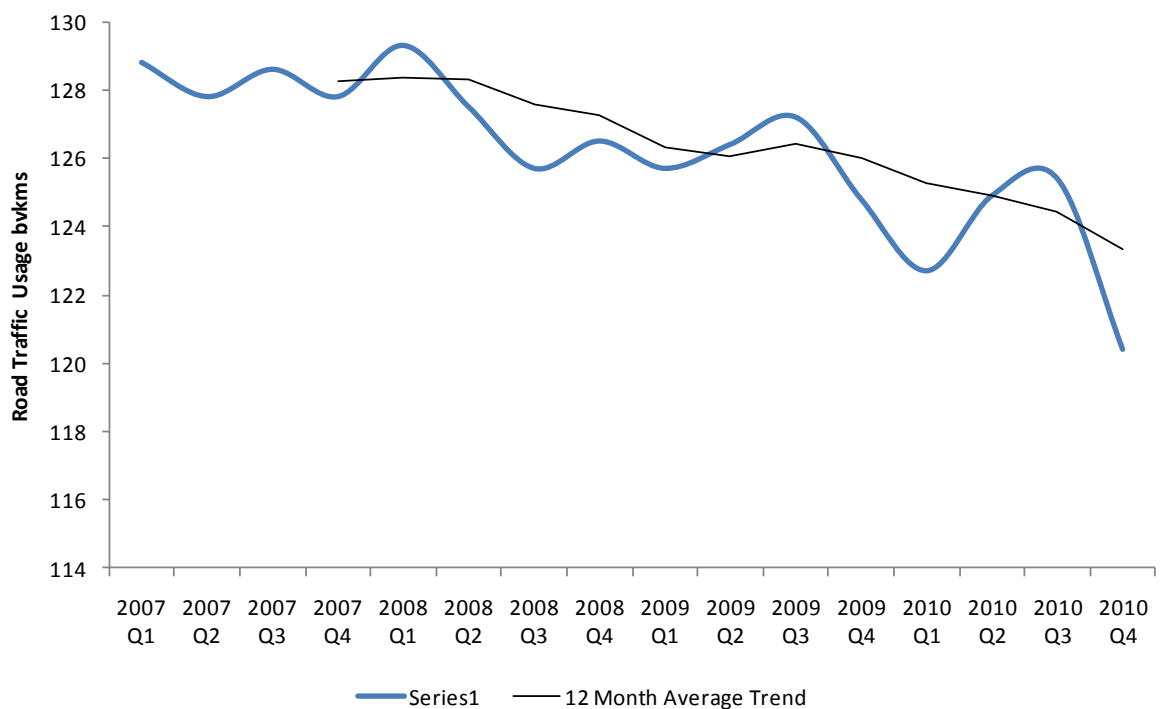
Year	M6 J32-31a AADT	% Change from 2007
2007	61230	-
2008	59885	-2.2%
2009	59012	-3.6%
2010	60936	-0.5%

4.12 Overall, there has been very little change in traffic levels since 2007 on the scheme route.

Scheme compared to national trends

4.13 To understand how to interpret the flow profile shown for the scheme against the backdrop of the economic recession, Figure 4.3 shows the national road traffic trends as collated by the Department for Transport (DfT) in their quarterly statistics.

Figure 4.3 – National Road Usage Trend (2007-2010) for all Vehicles



4.14 The graph demonstrates that the national trend between 2007 and 2010 is a reduction in road usage. While the road usage shows seasonal behaviour, the 12 month rolling average shows a steady trend of decline over this period.

4.15 Comparing the national and scheme figures on an annual level, Table 4.2 shows the relative trends.

Table 4.2 – National vs Local Traffic Trends

Year	Scheme Traffic (% change from 2007)	National Traffic (% change from 2007)
2007	0%	0%
2008	-2.2%	-0.8%
2009	-3.6%	-1.7%
2010	-0.5%	-3.8%

- 4.16 The table demonstrates that the scheme was experiencing a greater reduction in traffic levels between 2007 and 2009 than the national trend. However, since the scheme's completion in June 2009, the scheme extent has shown traffic growth while the national traffic level has reduced further. This suggests that the scheme has promoted and facilitated traffic growth as it bucks the national trend.

Journey Times

- 4.17 As an economy scheme, the key justification for this LNMS is a journey time benefit for road users. Therefore, this report considers evidence from both before and after the scheme to ascertain whether there has been a journey time benefit experienced due to the implementation of the M6 J32 southbound widening LNMS.
- 4.18 The scheme journey times are likely to be highly seasonal as visitors to the Lake District and Blackpool during the summer months are likely to see traffic volumes rise. Further, the Blackpool Illuminations, typically held between September and early November, tend to generate an influx of tourists to the region.
- 4.19 Therefore, the analysis of journey times must be careful to consider the variations throughout the day, throughout the week and throughout the year to identify the journey time effects of this scheme.

PAR Predicted

- 4.20 The PAR used a bespoke analysis to determine the vehicle hours saved by the scheme. Overall, it considers that the stretch of road from M6 J35 down to M6 J31 (Carnforth to Preston, approximately 28 miles apart) will benefit from the scheme.
- 4.21 The methodology adopted includes a spreadsheet analysis of JTDB data for the M6 north of J32 and the results of JMP modelling work for the section south of J32.

JTDB

- 4.22 The JTDB analysis compares journey times between April and September 2005 on Sundays and Bank Holiday Mondays (BHM) to average weekday journey times. It is then assumed that the difference between average journey times and Sunday/BHM journey times is delay associated with tourism on these days and that this will be reduced by the scheme.
- 4.23 From this, the PAR assumes that these represent typical Sunday/BHM savings that will be achieved by the scheme and annualises the benefit based on 5 Bank Holidays and 52 Sundays a year to produce a 1st year vehicle hour saving north of J32 of 144,193. This is then factored up to 154,251 vehicle hours to account for traffic growth prior to scheme opening.

JMP model

- 4.24 The saving for the M6 south of J32 is based on a modelling report produced by JMP Consultants. From this, it is predicted that there will be a saving of:
- 0.02 mins/vehicle in the AM Peak of 2 hours length;
 - 0.07 mins/vehicle in the PM Peak of 2 hours length; and
 - 2.35 mins/vehicle in the Sunday Peak of 6 hours length.
- 4.25 A simple multiplication by the flows for these periods produces a 1st year journey time saving of 81,133 vehicle hours south of M6 J32.

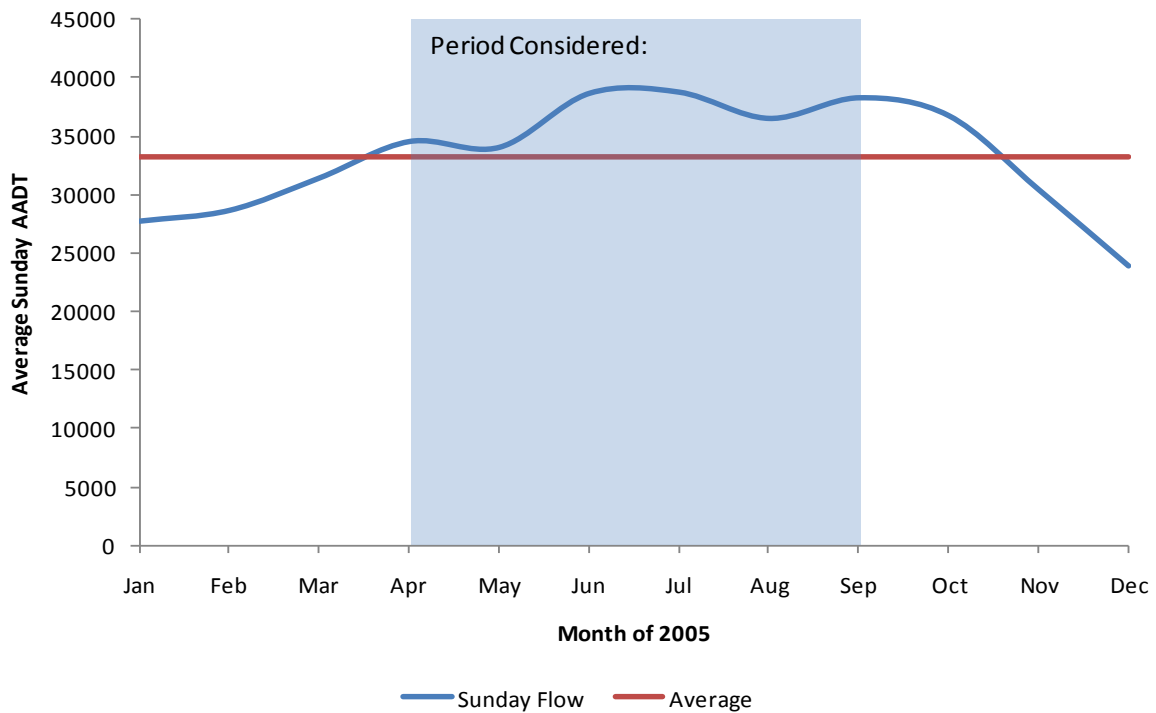
Overall

- 4.26 Therefore, the PAR concluded that a total of 235,384 vehicles hours will be saved in the opening year as a result of the scheme.

Predicted Corrected

- 4.27 The major area of concern with the PAR methodology for the predicted vehicle hour saving is the use of JTDB data from just the months April to September as evidence for the whole year benefit.
- 4.28 The traffic volume analysis earlier in this chapter informs that this section of road is very seasonal as it is heavily related to tourism. For example, the summer months will bring more tourism to Blackpool and the Lake District with many motorists using the M6 to access these areas. Therefore, to use the months of April to September as the base from which to factor up the whole year benefits may be an optimistic estimate (as this coincides with summer), that is likely to only demonstrate the peak benefit of the scheme.
- 4.29 Figure 4.4 demonstrates the variation in traffic level throughout 2005, the year used to calculate predicted benefits for the M6 J33-32 section over which the greatest benefit is forecast. The figure highlights the time during which calculations were based. This highlighted region was used as indicative of the full year, but the graph clearly demonstrates that the period used is the period of peak traffic. Therefore, it is fair to assume that the PAR overestimates the benefit of the scheme.

Figure 4.4 – AADT throughout 2005 on M6 J33-32 Southbound



4.30 The pattern is almost identical between J33 and J35. Therefore, the predicted corrected aims to reduce the factoring up of the April to September benefits in line with typical AADT figures for these months. The factors used to reduce the benefits in months outside of those considered in the PAR are shown in Table 4.3. The highlighted section of the table demonstrates the average flow for the period covered by the PAR method.

Table 4.3 – Pre-Scheme Monthly Flow Data

2005	J33-32		J34-33		J35-34	
	Sunday Flow	% of Peak Season	Sunday Flow	% of Peak Season	Sunday Flow	% of Peak Season
Jan	27691	75%	31617	83%	25343	77%
Feb	28623	78%	33416	88%	27401	83%
Mar	31417	85%	35767	94%	29791	90%
Apr-Sept	36827	100%	37920	100%	32976	100%
Oct	36778	100%	37512	99%	32309	98%
Nov	30413	83%	32832	87%	27947	85%
Dec	23833	65%	31567	83%	26115	79%

4.31 Using these factors, along with the PAR predicted figures for daily vehicle hour saving between April and September, Table 4.4 shows the predicted corrected calculation of vehicle hour saving between J32 and J35.

Table 4.4 – Recalculation of J32-J35 Vehicle Hour Savings

Month	J33-32		J34-33		J35-34		BHM's	Sundays
	BHM Hrs Saved	Sunday Hrs Saved	BHM Hrs Saved	Sunday Hrs Saved	BHM Hrs Saved	Sunday Hrs Saved		
Jan	1,987	1,786	233	41	171	35	1	5
Feb	2,054	1,847	247	43	185	38	0	4
Mar	2,254	2,027	264	46	201	42	1	4
Apr	2,642	2,376	280	49	223	46	0	4
May	2,642	2,376	280	49	223	46	2	5
Jun	2,642	2,376	280	49	223	46	0	4
Jul	2,642	2,376	280	49	223	46	0	5
Aug	2,642	2,376	280	49	223	46	1	4
Sept	2,642	2,376	280	49	223	46	0	4
Oct	2,639	2,373	277	48	218	45	0	5
Nov	2,182	1,962	242	42	189	39	0	4
Dec	1,710	1,538	233	41	177	36	1	4
Annual Hrs Saved	12,167	112,062	1,338	2,411	1,042	2,219	-	-
%age	95%		3%		2%		-	-
Total Hrs Saved:				131,238				
Opening Year Hours Saved (2009):				140,392		Growth at 1.7%/yr		

- 4.32 The table demonstrates that the reforecast savings for the section north of J32 has reduced the predicted saving from 154,251 vehicle hours to 140,392 vehicle hours.
- 4.33 It is also worth noting that 95% of the benefits are expected from the M6 J33-32 section of road and that the benefits on the other sections are relatively small in comparison.
- 4.34 The second area of concern with the PAR method of calculating benefits is that it is based on the assumption that Sunday and Bank Holiday Monday journey times should be at average weekly levels. This may be unrealistic given that Sundays and Bank Holidays have proven to have greater demand, and therefore, even in the absence of significant congestion, journey times may be slower. However, this is only a secondary concern and does not warrant correcting in this stage.
- 4.35 Adding the reforecast vehicle hour savings north of J32 to the modelled benefits expected south of J32 means that the predicted corrected vehicle hour saving is 221,525 vehicle hours in the opening year.

Outturn

- 4.36 The evaluation of the journey time impact of the scheme is complicated due to the variable nature of the scheme's benefits. There is a large amount of variation during the day, week and year so that the timing of the surveys will mean that some assumptions and factoring will be required to effectively measure the impacts.
- 4.37 Further, as the widening was at the junction, there are potential benefits downstream on the M6 J32-31a and beyond, upstream on the M6 J33-32 and on the M55 eastbound upstream. The PAR method considered all of these except the M55. Therefore, the analysis will first attempt to understand where the journey times are being influenced and how, before attempting to quantify the benefit.
- 4.38 This evaluation will be based on HA JTDB data for the above mentioned roads as this is the most consistent data with which to successfully capture the impacts. The danger of this approach is that the JTDB data quality for the area is classed as low. However, it is thought that despite this, provided the JTDB data is logical, it should be the preferred choice as it is the only source of data that will show the pattern through the year.

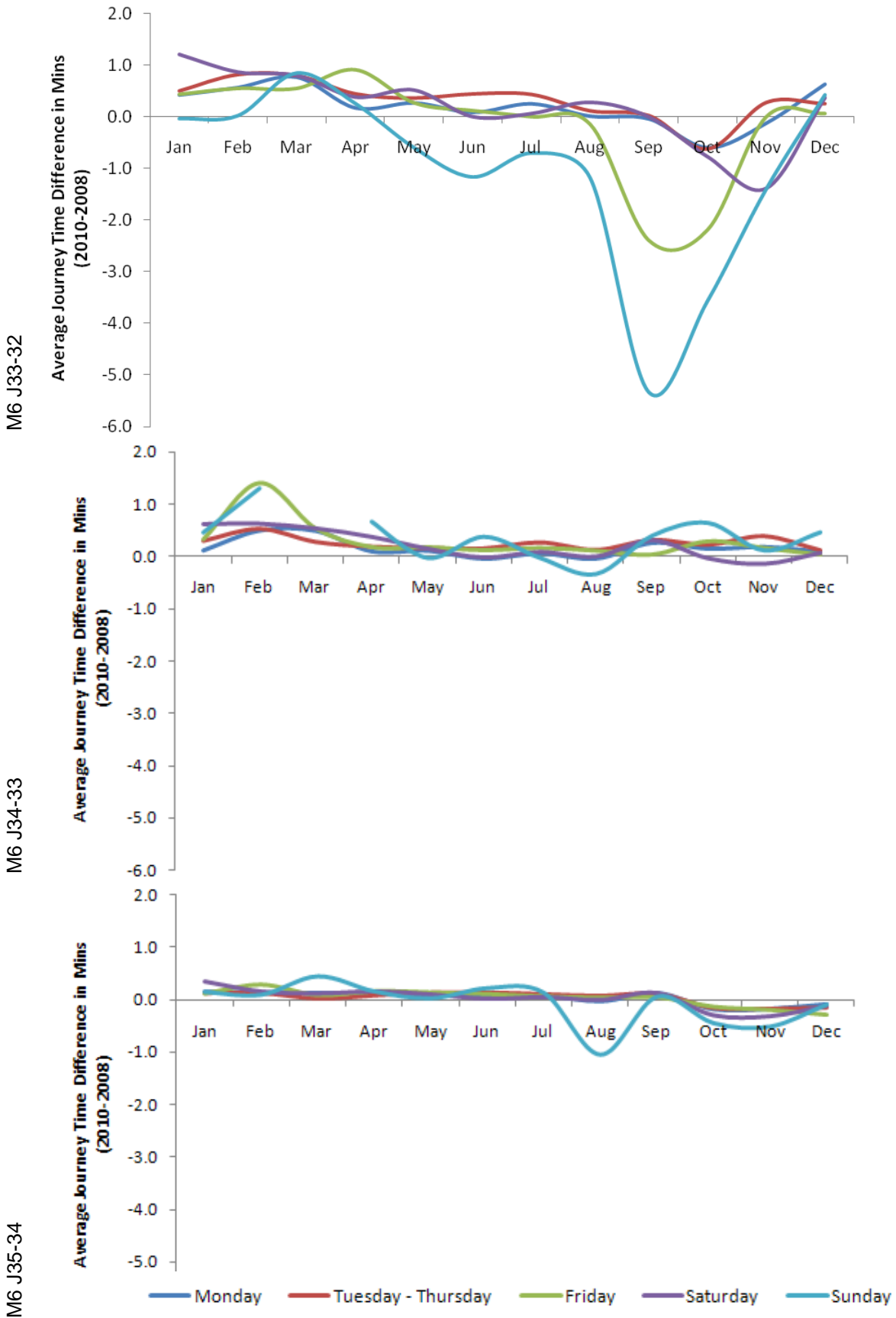
Where do the benefits occur?

- 4.39 This section aims to understand where the benefits of this scheme occur. Logically, it is expected that the benefits would be upstream of the widening (i.e. M6 J33-32 or even further north), but it is also possible that the benefits could be observed upstream on the M55 prior to the merge and/or on the M6 south of the scheme.
- 4.40 By considering a pre-scheme year of 2008 and a post-scheme year of 2010, the JTDB data has been interrogated to show an average journey time difference (post-scheme minus pre-scheme) by month. The analysis looks at these journey time differences by road section in the following order:
- M6 North of J32;
 - M6 South of J32; and
 - M55 J1 to M6.

M6 North of J32

- 4.41 Figure 4.5, shows that, as anticipated, the M6 J33-32 section experiences the greatest change in journey times as a result of the scheme. While there are fluctuations throughout the year, the key reduction in journey times occurs between May and November in line with the summer peak and Blackpool Illuminations. It is reassuring that the data demonstrates the most realistic pattern given the tourist demand for the area.
- 4.42 The most significant changes occur on Sundays, as predicted in the PAR. This is consistent with the presumption of tourists returning home after a week or weekend away. This Sunday reduction is most prominent in September and October, in line with the Blackpool Illuminations, peaking at 5.5 minutes per vehicle average journey time saving.
- 4.43 There also appear to be significant savings on Fridays over the period of the Blackpool Illuminations (September to early November). This was not discussed in the PAR, but will be examined for the outturn analysis.
- 4.44 There is some evidence of savings on other days, but then there is also some evidence of dis-benefits. Given the quality of data used it is not possible to be certain that other variations are observed changes as further noise in the data could cause some of these effects. Therefore, just the previously mentioned Friday and Sunday benefits will be explored further.

Figure 4.5 – Change in Average Journey Time



4.45 The graphs for the other road sections north of J33 have been set to the same scale as the first, in order to compare the scale of the changes effectively. It is immediately noticeable that the other road sections are affected much less by the scheme. In fact, the scale of the journey time differences on the other road sections north of J32 are too small to be confident that the change is caused by the scheme.

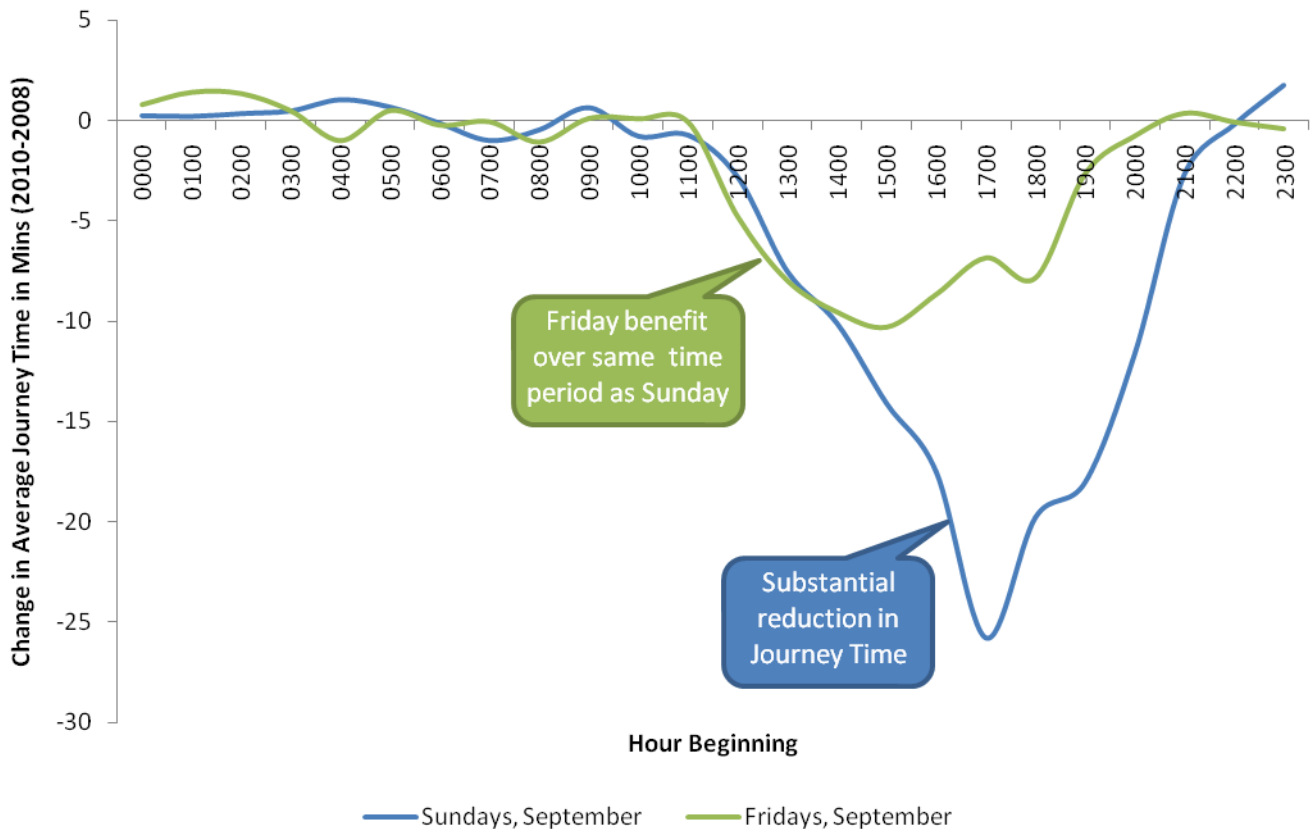
4.46 Therefore, for the purposes of ensuring a robust evaluation, only the M6 J33-32 road section will be used to calculate benefits north of the scheme. Neither the J34-33 nor the 35-34 sections demonstrate a significant journey time reduction and the variation shown on these graphs is inconsistent with that shown for the J33-32 section. Therefore, it appears the impact of the scheme was only observed on this stretch.

4.47 It is considered robust to remove M6 J33-35 from the analysis, based both on the analysis presented here and based on the fact that the predicted benefits were 95% from J33-32 and so the evaluation will still consider the majority of the impact.

Time of Day

4.48 To further understand the profile of journey time changes due to the scheme, the journey time savings for the M6 J33-32 section have been interrogated by time of day. This is done for Sundays and Fridays in September as these were the days that showed the greatest benefits due to the scheme. These two analyses should help us to understand and further quantify the level of benefits observed. The findings are demonstrated in Figure 4.6.

Figure 4.6 – M6 J33-32 Journey Time Difference by Time of Day in September



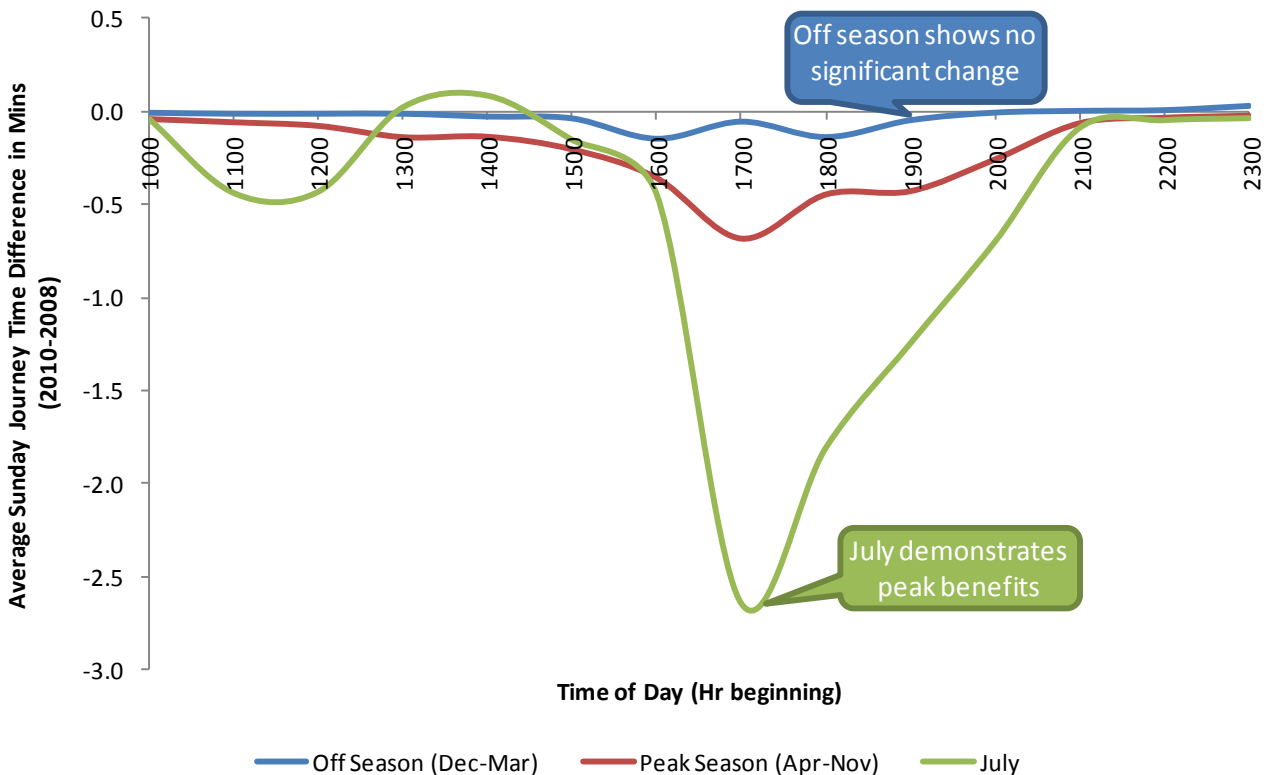
4.49 There are two key messages from this analysis by time of day. Firstly, in the morning there is fluctuation that is inseparable from the background noise. This can be ignored as simply noise in the data based on the fact that no two days are ever the same.

- 4.50 The second and main message is seen very prominently. The Sundays in September demonstrate a very clear depiction of the impact of the scheme. Between 1000 and 2200 there are reductions in journey times. From 1200 to 2100 this reduction is greater than 1 minute saving per vehicle and peaks at approximately 26 minutes saved per vehicle at 1700.
- 4.51 This pattern falls in line with the PAR prediction of Sunday PM journey time savings.
- 4.52 The Fridays in September analysis shows that benefits occur over the same time period as the Sunday peak, just to a smaller degree. For a Friday, the peak saving is approximately 10 minutes per vehicle at approximately 1500.
- 4.53 In summary, the data available from the JTDB is consistent with the PAR description explaining the key problem as Sunday afternoons. There also appears to be a further benefit to the Friday afternoon peak during the tourism period.
- 4.54 The annual profile is consistent with the intuitive relationship with the tourism industry as the summer months and period during the Blackpool Illuminations demonstrate the majority of the savings.

Impacts South of the Scheme

- 4.55 The PAR used a model to predict journey time benefits south of M6 J32. It predicted benefits in the weekday AM and PM peaks, and the Sunday peak. To test if these are observable in the JTDB data, the graphs in Figure 4.7 and Figure 4.8 have been provided.

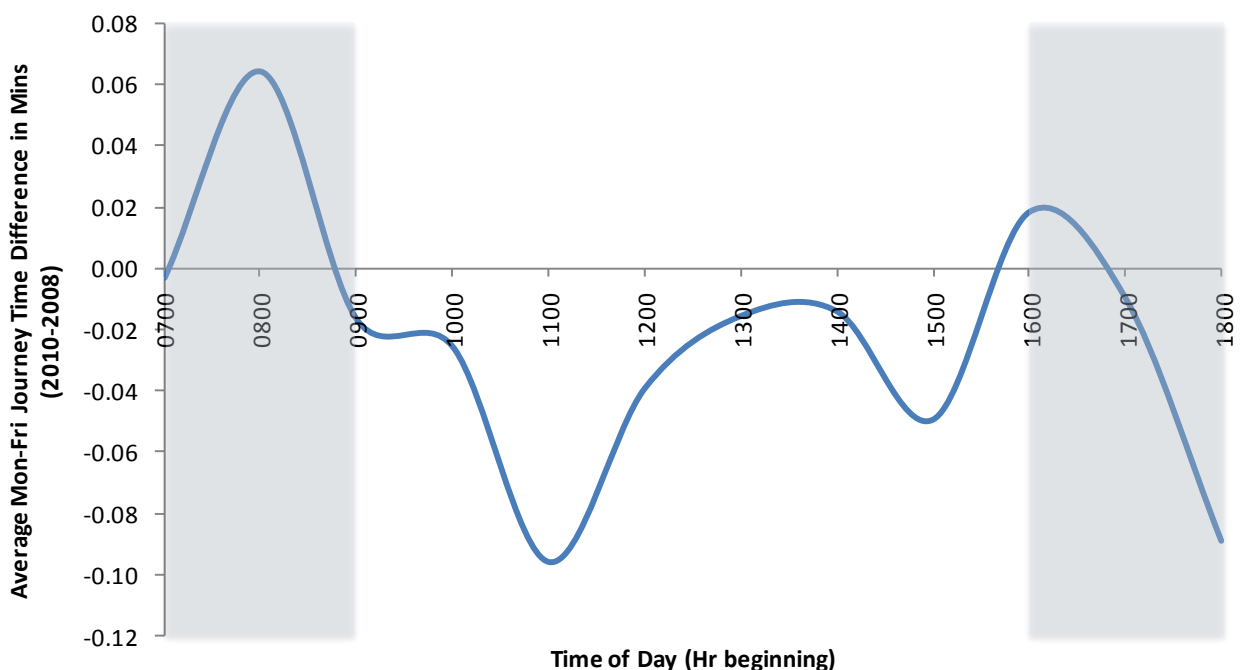
Figure 4.7 – Sunday Peak Journey Time Saving M6 J32-31a



- 4.56 Considering the Sunday Peak, Figure 4.7 shows the average journey time saving per vehicle split into the tourism season (April to November) the off season (December to March), and July alone.
- 4.57 From this graph, it is evident that there does appear to be a saving during the afternoon Sunday peak hours during the tourism season. This reaches a peak in July with savings of up to 2.6 minutes per vehicle during hour beginning 1700.

- 4.58 The off season shows little change in journey times as a result of the scheme; the changes observed are indistinguishable from background noise in the data. Therefore, it is considered that there is evidence of journey time changes during the tourism season and that this should be quantified. However, the off season between December and March will not be quantified for the Sunday peak.
- 4.59 The changes in journey time shown in Figure 4.8 aim to uncover the impact on the weekday AM and PM peak periods. The graph shows the change in journey time per vehicle for a Monday to Friday weekday.
- 4.60 The graph shows no notable reaction in the AM or PM peak with a maximum change during the period of 0.1 minutes (i.e. 6 seconds). The journey time changes are too small to be separated from chance or fluctuations due to the quality of the JTDB data.

Figure 4.8 – Mon-Fri AM/PM Peak Journey Time Saving M6 J32-31a

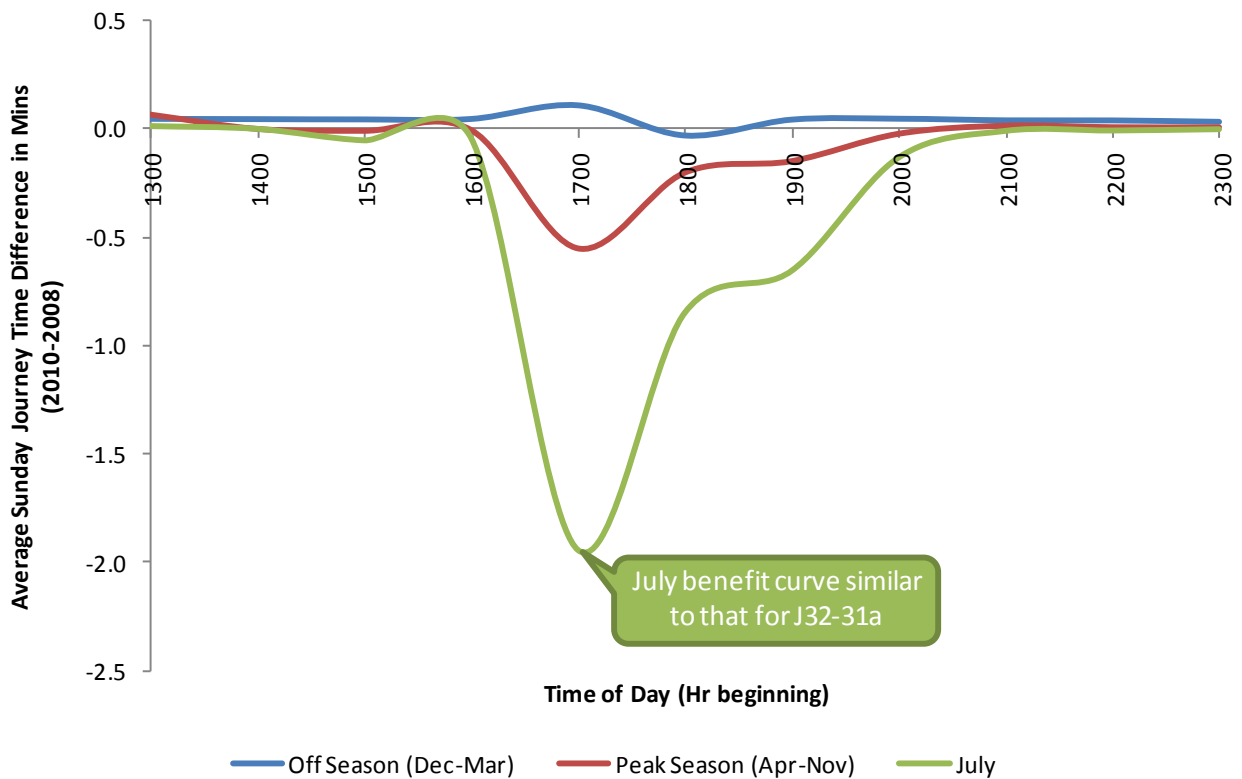


- 4.61 Therefore, it is concluded that there is no quantifiable benefit to the AM/PM weekday peak periods as a result of the scheme, but that the benefit to M6 J32-31a during the Sunday peak should be quantified. Overall the benefits south of J32 are much lower than on J33-32, as expected.

M55 J1 to M6

- 4.62 This section was not evaluated in the PAR but logically may incur a journey time change as a result of the scheme. Based on the evidence presented so far, the most likely time to observe any change on this stretch will be the Sunday peak, between April and November. Figure 4.9 analyses the JTDB data for evidence of savings during this period.
- 4.63 The graph for M55 J1 to M6 is very similar to Figure 4.7 which demonstrated the benefits to the M6 J32 to 31a section. It clearly shows that there is no benefit to the off season, but that the peak tourism season and especially July, see significant benefits.
- 4.64 The timescale and magnitude of these benefits are very similar to the M6 J32-31a section, demonstrating the peak impact between 1600 and 2100. This Sunday benefit will also be quantified as part of the outturn evaluation of this scheme.

Figure 4.9 – Sunday Peak Journey Time Savings M55 J1 to M6



Bank Holiday Mondays

4.65 Finally, the scheme also predicted benefits for Bank Holiday Mondays as these had in the past shown similar traffic behaviour to Sundays. In order to test whether there has been an impact on Bank Holiday Mondays (BHMs) a journey time difference graph by time of day has been provided for the main three road sections:

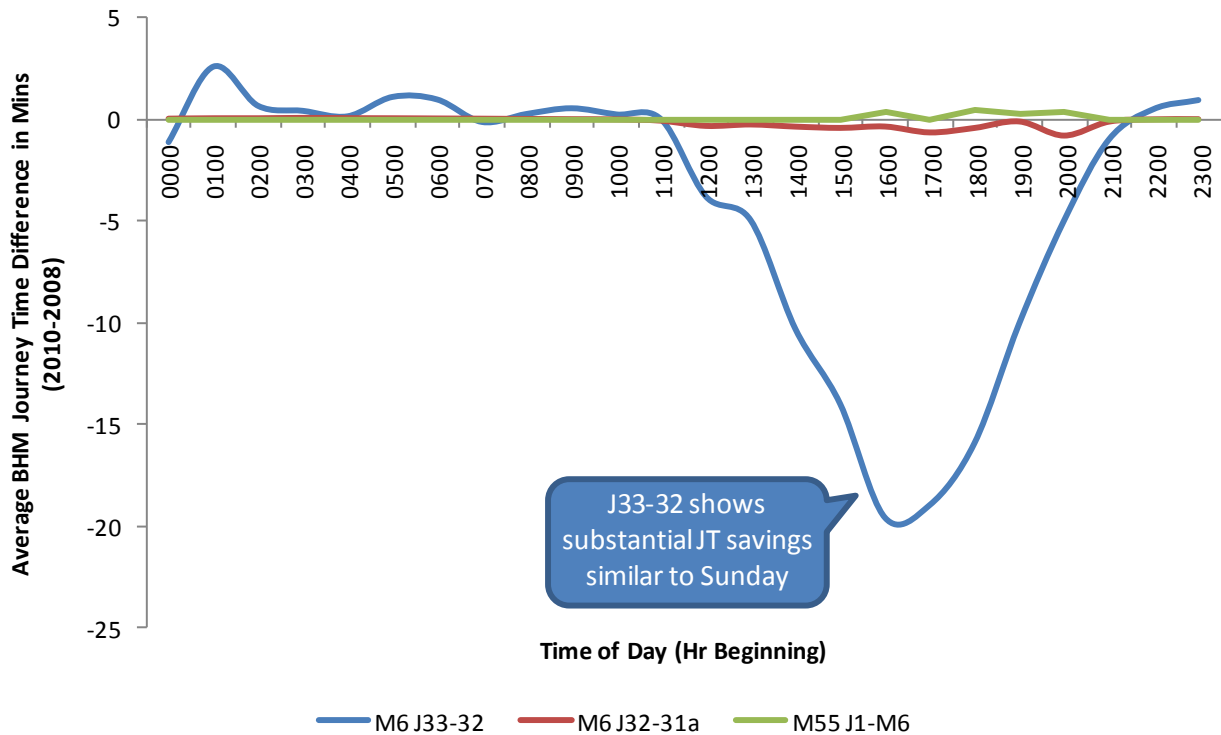
- M6 J33-32;
- M6 J32-31a; and
- M55 J1 to M6.

4.66 This graph is shown in Figure 4.10. It shows very distinctive behaviour between the three road sections. The M6 J33 to 32 north of the scheme demonstrates significant benefits peaking at around 20 minutes per vehicle at hour beginning 1600. In fact, the benefit pattern is almost identical to the Sunday findings (see Figure 4.6) with benefits accumulating as of 1100, peaking at 1600 and ceasing at 2200. This benefit is substantial and must be considered when deriving the total vehicles hours saved.

4.67 The other two road sections – M6 J32-31a and M55 J1 to M6 – do show some variation over the day but the changes are not substantial. In fact, given the data quality it is not easy to differentiate whether these changes are actual observed changes attributable to the scheme or a result of background noise.

4.68 Therefore, the analysis of Bank Holiday Mondays has proven that they have been influenced by the scheme. This has mainly happened on the M6 between J33 and J32 southbound in a very similar timeframe and scale as seen earlier for Sundays during the peak season. Other road sections have not proven to be affected by the scheme on BHMs and so the evaluation will just consider M6 J33-32.

Figure 4.10 – Bank Holiday Mondays



Quantifying the Benefit

4.69 Quantifying the benefit of the scheme in vehicle hours is difficult due to the fluctuations throughout the year, the days of the week and the hours of the day. Therefore, based on the findings of the above analysis, the following assumptions will be made to attempt to quantify the benefit:

- **M6 North of J32:** Only consider changes on the M6 J33-32 southbound as this is the only road to demonstrate change that we can be confident is due to the scheme. The benefits on this stretch appear on Sundays, Fridays and Bank Holiday Mondays, between 1000-2200 during the tourism (April to November) season. All other days show changes that are too small to be confident that the change is caused by the scheme;
- **M6 South of J32:** No quantifiable benefit to weekday peaks as predicted in the PAR so this is ignored. However, there is evidence of benefits to the Sunday peak, during the tourism season between 1600-2100, which will be considered;
- **M55 to M6:** Consider just the benefits to the Sunday peak period, during the tourism season between 1600-2100, as demonstrated above. This remains consistent with the south of J32 benefits which showed a similar profile in the above analysis; and
- **Data Quality:** Assume that the variations due to the quality of JTDB data are the same pre and post-scheme and therefore that we can compare the datasets and be confident of recording change due to the scheme.

To calculate the time saving for each day, JTDB and TRADS flow data, broken down by day and hour, was used.

4.70 To calculate the total vehicle hour saving for each day, the difference in journey time for a given hour is multiplied by the flow in that given hour. This process provides an average saving for each day each month. It is then a simple multiplication task using the number of each day in each month to reach an annual journey time benefit due to the scheme.

4.71 The results of the journey time saving calculations are shown in Table 4.5.

Table 4.5 – Journey Time Saving by Day of Week

	Number of days in 2010	Year's Journey Time Difference (hours)	%*
M6 J33-32 (1000-2200, Apr-Nov)			
Friday	53	-27,046	20%
Sunday	52	-76,250	55%
BHM	5	-28,599	21%
M6 J32-31a (1600-2100, Apr-Nov)			
Sunday	52	-5,492	4%
M55 J1 to M6 (1600-2100, Apr-Nov)			
Sunday	52	-1,070	1%
Total Vehicle Hour Change		-138,456	100%

*Note that due to rounding, the percentages appear to sum to 101%.

- 4.72 The table demonstrates that the majority of vehicle hour savings are from the M6 J33-32 road section, and that most of this is from the Sunday peak period. There are small contributions to the benefits from the M6 J32-31a and M55 J1 to M6 road sections, though together these contribute only 5% of the total savings from the scheme.
- 4.73 The analysis concludes that in 2010, there was a vehicle hour saving of 138,456 attributable to the scheme. This is less than both the predicted and predicted corrected forecasts of 235,384 and 221,525 vehicle hours respectively.
- 4.74 The main reason for the scheme not achieving the forecast benefits is due to the section south of M6 J32. The PAR predicted that 81,133 vehicle hours would be saved on this section through a combination of benefits to the weekday AM/PM peak periods and the Sunday peak period.
- 4.75 However, the analysis showed no quantifiable evidence of savings to the weekday peaks, and only 5,492 hours of benefit during the Sunday peak.
- 4.76 Further, there were no benefits detectable north of J33, even though the scheme had predicted benefits up to J35. This doesn't mean that this section has not been affected, rather that the change was not large enough to be evident based on the evaluation methodology.
- 4.77 The scheme has been successful in reducing journey times, and appears to have successfully targeted its prime focus of the Sunday and Bank Holiday Monday tourism traffic. As a result of the reduced journey times on certain days and at certain times of the year, both 'Transport Economic Efficiency' and 'Reliability' have been scored as beneficial in the scheme's EST.

Summary

The traffic analysis has presented some interesting results due to the scheme. These include:

- Scheme appears to have facilitated traffic growth in the area as has not followed the declining trend seen elsewhere in the country during the recession;
- The scheme has produced huge time savings during the tourism season, particularly on Sunday and Bank Holiday Monday afternoons;
- Savings along the M6 peak at 26 minutes per vehicle, demonstrating the success of this scheme in pursuing its objectives; and
- The scheme has saved 138,456 vehicles hours in the opening year, although this is less than predicted due to a lack of savings south of M6 junction 32.

5. Safety Impacts

- 5.1 A key consideration when implementing any change on the highway network is how this change will affect the safety of the road.
- 5.2 The aims of this section are:
- To determine whether the scheme has achieved its PAR predicted safety objectives; and
 - To determine whether there has been any change in the frequency, location or causation of personal injury accidents (PIAs) following scheme opening.
- 5.3 This section considers evidence of accidents from before and after scheme opening to establish whether it has resulted in a change in accident rate. If this is found to be the case, the accident rate change will be monetised and presented as either a benefit or dis-benefit related to the scheme and considered as part of the overall assessment of scheme performance.

PAR Predictions

- 5.4 The Project Appraisal Report (PAR) for this scheme outlines the pre-scheme conditions, including the accident rate. This is recorded as 12.6 accidents per year, including 1 serious accident per year and no fatal accidents. The pre-scheme severity index is thus recorded as 7.9%. The full pre-scheme scenario, between 2003 and 2008, is outlined in Table 5.1. These accidents are on the M6 southbound carriageway from two miles north of the M6 J32 to two miles south of the junction.

Table 5.1 – Summary of pre-scheme accidents as documented in the PAR

Year from	Fatal	Serious	Slight	Total	Severity Index
1 st Jan 2003	0	2	17	19	11%
1 st Jan 2004	0	0	9	9	0%
1 st Jan 2005	0	1	9	10	10%
1 st Jan 2006	0	0	15	15	0%
1 st Jan 2007	0	2	8	10	20%
Per Annum	0	1	11.6	12.6	8%

- 5.5 It is evident from the table that the number of accidents per year fluctuates considerably from a high of 19 accidents in 2003 to a low of 9 accidents in 2004.
- 5.6 The PAR also notes that 56% of accidents in the pre-scheme period are shunt-type accidents. This is perhaps expected given the congested road conditions experienced in the pre-scheme period along the scheme extent.
- 5.7 The PAR predicted that the scheme will reduce the accident rate by 4.5 accidents per year. This was based on a decision by the MAC that the scheme was likely to reduce the shunt-type accidents by two-thirds due to less congestion. Therefore, the expected accident rate following the scheme was 8.1 accidents per year.

Predicted Corrected

- 5.8 The first stage of the safety evaluation is to complete an independent check of the pre-scheme scenario, to check that the numbers and severities of accidents shown in the PAR can be replicated.
- 5.9 A predicted corrected scenario is then produced to take account of any differences that may arise when attempting to replicate the PAR data. Two different predicted corrected scenarios are calculated:
- Using the same dates as the PAR, but using the study area from the evaluation (which may be wider or narrower than the geographical area used in the PAR); and
 - Using the study area from the evaluation but for the most recent (usually five year) period prior to scheme construction.
- 5.10 As stated earlier, the PAR included only accidents for the M6 southbound carriageway. However, as the scheme has also delivered a benefit to eastbound M55 traffic (through reducing queuing through the on-slip road and the merge), it seems appropriate to include the accidents on the eastbound M55 in the predicted corrected scenario.
- 5.11 The predicted corrected data (for both the PAR dates and most recent dates) is summarised in Table 5.2. With the addition of accidents on the eastbound M55, the annual accident rate based on the PAR dates has increased from 12.6 to 15.8. This reduces to 13.8 when looking at the most recent dates (November 2003 to October 2008). The reason for this reduction is that in the five years immediately preceding the scheme, the number of slight accidents recorded is lower by 10 PIAs than for the PAR dates.

Table 5.2 – Corrected pre-scheme accidents

Pre-Scheme	Dates		Fatal	Serious	Slight	Total
Predicted Corrected (PAR dates)	Jan 2003 to Dec 2007	PIAs	0	6	73	79
		Rate (per annum)	0	1.2	14.6	15.8
Predicted Corrected (Most recent)	Nov 2003 to Oct 2008	PIAs	0	6	63	69
		Rate (per annum)	0	1.2	12.6	13.8

- 5.12 The pre-scheme accident locations for both the southbound M6 and eastbound M55 are set out in Figure 5.1. These accidents are from the period November 2003 to October 2008.

Figure 5.1 – Predicted Corrected (recent dates) Accident Locations



Outturn

- 5.13 For the outturn accident rate, safety data is requested for the same geographical area as used in the predicted corrected scenarios from the date of scheme opening to as recent a date as possible (minimum one year).
- 5.14 The outturn accident data is summarised, along with the predicted corrected for comparison, in Table 5.3.

Table 5.3 – Post-opening accident comparison

	Dates		Fatal	Serious	Slight	Total	Severity Index
Predicted Corrected (Most recent)	Nov 2003 to Oct 2008	PIAs	0	6	63	69	9%
		Rate (per year)	0	1.2	12.6	13.8	
Outturn	Jun 2009 to May 2010	PIAs	0	1	6	7	14%
		Rate (per year)	0	1	6	7	
Annual Accident Reduction			0	0.2	6.6	6.8	-

- 5.15 The table demonstrates that there has been a large reduction in accidents as a result of the scheme. Overall, the scheme is shown to have reduced accident rates by 6.8 accidents in the opening year. This includes reducing the annual rate of serious accidents by 0.2 and the annual

rate of slight accidents by 6.6. Further interrogation of the accident saving has shown that approximately half of the saving has come from the M55 eastbound, vindicating its inclusion in the accident analysis.

- 5.16 While the table also shows an increase in severity index, this should not be an area of too much concern. As severity index is a ratio, it will increase when slight accidents are reduced. As there has been no increase in KSI accidents (in fact a reduction of 0.2), the scheme is not performing poorly on severity.

Comparison of predicted and actual savings

- 5.17 This section has outlined the accident rates over the scheme extent under various criteria, and has led to using an evidence based approach to determining the impact of the scheme. In this sub-section, the predicted and actual accident savings are explored.
- 5.18 The PAR predicted a saving of 4.5 accidents in the opening year, which over 60 years is thought to equate to 371 accidents saved. This was based on the assumption that the scheme would be effective at reducing shunt accidents by two thirds.
- 5.19 However, as earlier discussed, the PAR did not include accidents that have occurred on the eastbound M55 approach to the M6 J32. The predicted corrected scenarios included these M55 accidents, and hence the predicted accident savings were calculated to be higher than that in the PAR, at 5.6 and 4.9 for the PAR dates and most recent dates respectively. These opening year savings give rise to 60 year savings of 465 and 406 respectively.
- 5.20 The outturn accident saving (compared to the most recent predicted corrected data) has been calculated as 6.8, so is higher than the 4.9 forecast. However, it is also noted that had the PAR dates predicted corrected data been used in the calculation of outturn accident saving, then a saving of 8.8 would have been achieved. Nonetheless, it is perhaps more robust to use the most recent data available, hence a saving of 6.8. Given this reduction in annual accident rate, accidents have been scored as 'Beneficial' in the scheme's EST. Based on an opening year saving of 6.8, the 60 year saving is forecast to be 560.

Table 5.4 – Comparison of Predicted and Actual Accident Savings

	Time Period	Opening Year PIA Saving	60 Year PIA Saving
PAR Predicted	Jan 2003 to Dec 2007	4.5	371
PAR Predicted Corrected	Jan 2003 to Dec 2007	5.6	465
Predicted Corrected (latest dates)	Nov 2003 to Oct 2008	4.9	406
Outturn (Jun 2009 to May 2010)	Compared to PAR	8.8	725
	Compared to most recent	6.8	560

Accident Causation

- 5.21 The STATS19 accident data provides a comprehensive dataset regarding the accidents that have occurred. This provides lots of information, from the types of vehicles involved in accidents to the weather and causes of accidents. Therefore, examining this information in more detail can reveal the catalysts of accident reduction.

Table 5.5 – Vehicle Movement in Accidents per Annum

Movement	Predicted Corrected (latest dates)	Outturn
Going Ahead	15.8	15.0
Slowing, Stopping, Moving Off	5.6	0.0
Changing Lane	4.8	3.0

- 5.22 The PAR for this scheme discusses a reduction in shunt type accidents by keeping traffic flowing smoothly. Table 5.5 shows the annual accidents by movement, ranked by the most common pre-scheme movement involved in accidents.
- 5.23 As would be expected on a motorway, the most common movement when an accident occurs is going ahead. Frequency of these accidents has reduced very slightly as a result of the scheme.
- 5.24 Of greater importance is the number of vehicles slowing, stopping or moving off as part of an accident. This has reduced entirely from 5.6 vehicles per annum to 0 in the post-scheme observed year. This is the movement typically associated with shunt accidents as moving traffic collides with crawling, stopping or moving off traffic. Therefore, it appears that the scheme has been successful at reducing this cause of accidents.
- 5.25 Further, it is also interesting to note that changing lane accidents have reduced as a result of the new layout, even though the new layout still requires M55 vehicles to merge with the M6 traffic.

Summary

The safety analysis presented has demonstrated that the scheme has been successful in its aim to reduce accidents, including the shunt type accidents described in the PAR. The analysis showed:

- The scheme to have saved 6.8 accidents in the opening year and is forecast to save 560 over the 60 year assessment period. This is a great success for the scheme. Approximately half of this saving was attributable to the M55 eastbound approach to the M6 J32, which was not included in the PAR appraisal; and
- The STATS19 data has revealed that the slowing, stopping and moving off type accidents that are associated with shunt accidents have reduced from 5.6 per year to 0 post-scheme.

6. Economy

- 6.1 This section of the report presents information regarding the forecast and outturn economic impacts of the scheme based on observed data from both before and after the scheme opened. A review of scheme costs against those forecast will also be undertaken, thus allowing the scheme's overall value for money to be assessed.
- 6.2 These figures will also provide the opportunity to consider the accuracy of PAR predictions of costs and benefits, to understand how value for money was appraised, and to inform future LNMS.
- 6.3 Economic benefits presented in this section are derived from:
- Safety benefits associated with any reduction in accidents observed at the scheme location; and
 - Journey time benefits associated with a reduction in the typical journey time along the route.

Safety Benefits

- 6.4 In scheme appraisal, safety benefits are calculated by converting a predicted reduction in accident rate to a monetary benefit based on figures dictating the average cost of an accident.
- 6.5 To evaluate the scheme post-opening, this process has been repeated with the observed, one year after change in accident rate, to indicate the likely safety returns of this scheme.

Forecast Safety Benefits

- 6.6 Prior to the scheme, the PAR made a forecast of the likely safety benefits associated with the scheme. These calculations have since been checked independently (see predicted corrected PAR years) and updated based on the latest accident data prior to the start of scheme construction (five years prior to construction).
- 6.7 The forecast accident savings and associated monetary benefits are shown in Table 6.1 below. Note that the 60 Year benefits are in 2002 prices, discounted to 2002.

Table 6.1 – Calculation of Forecast Safety Benefits (PAR and Predicted Corrected)

	PAR (Jan 2003 - Dec 2007)	Predicted Corrected	
		PAR Years	Five Years prior to Construction
Opening Yr accident saving	4.5	5.64	4.93
Accident Capitalisation Factor	82.4	82.4	82.4
60 Yr Accident Saving	371	465	406
Average Cost of Accident in Opening Yr	£83,590	£83,590	£83,590
Accident Benefit in Opening Yr	£376,155	£471,686	£411,979
Accident Benefit (2002 prices)	£295,654	£370,741	£323,812
Capitalisation Factor	72.26	72.26	72.26
Accident Benefit over 60 Yrs (Discounted to 2002)	£21.364m	£26.790m	£23.399m

- 6.8 The PAR anticipated first year benefits of £295,654 growing to £21.4m over 60 years. However, following the inclusion of accidents on the M55 eastbound approach to M6 J32, the predicted corrected accident savings were increased, giving a predicted corrected (most recent) saving of £323,812 in the opening year growing to £23.4m over 60 years.

Outturn Safety Benefits

- 6.9 Using observed data from the first year after opening it has been possible to calculate the first year safety benefit and to refine our estimate for the 60 year assessment period benefit.
- 6.10 These calculations are shown in Table 6.2 for both outturn versus PAR years and outturn versus most recent pre-scheme years. Note that the most recent years will be used in this evaluation as it is the most up to date and isolates the impact of the scheme. The PAR years comparison is provided for completeness.

Table 6.2 – Calculation of Outturn Safety Benefits

	Compared to PAR Years	Compared to 5 most recent pre-construction years
Opening Yr accident saving	8.8	6.8
Accident Capitalisation Factor	82.4	82.4
60 Yr Accident Saving	725	560
Average Cost of Accident in Opening Yr	£83,590	£83,590
Accident Benefit in Opening Yr	£735,592	£568,412
Accident Benefit (2002 prices)	£578,169	£446,767
Capitalisation Factor	72.26	72.26
Accident Benefit over 60 Yrs (Discounted to 2002)	£41.779m	£32.284m

- 6.11 The outturn benefits are higher than those forecast in the PAR and higher than both predicted corrected scenarios. The first year safety benefit is observed as £568,412 and is now expected to grow to £32.3m over the scheme life.
- 6.12 The outturn accident saving of 6.8 is approximately 40% higher than the predicted corrected (most recent) accident saving.

Journey Time Benefits

- 6.13 The journey time benefits due to the scheme can also be monetised to assess value for money. This process is outlined within this section.

Value of Time (VOT)

- 6.14 The scheme is largely aimed at reducing journey times on Sundays and Bank Holiday Mondays and uses a standard value of time of £12.86 per hour. However, this value of time is based on typical weekday traffic and is not necessarily suitable for a scheme, such as M6 J32 SB Widening, aimed at addressing delays to tourists on Sundays.
- 6.15 The likely benefit of the scheme will be more centred on leisure trips and so the value of time used for predicted corrected and outturn journey time benefits has been adjusted to better reflect this.
- 6.16 Using WebTAG 3.5.6 to inform about VOT and vehicle proportions, it is evident that weekend traffic is typically only 11.7% work and commuting whereas the weekday average is 47.4% work and commuting. Commuting and business trips have a higher value of time than other trips due to the time priorities of businesses. Therefore, recalculating VOT based on these findings reduces the VOT from £12.86 per hour in the PAR to £10.30 per hour for weekend traffic.
- 6.17 This figure will be used to calculate the journey time benefits for both the predicted corrected and outturn scenarios.

Forecast Journey Time Benefits

- 6.18 The forecast journey time benefits for the M6 J32 southbound widening schemes were derived from vehicle hour savings from a transport model and from JTDB observations.
- 6.19 The calculation to monetise these vehicle hour savings was roughly in line with the standard PAR method, though it used a capitalisation factor based on NRTF growth rather than the predicted 36% traffic growth over 60 years specified in the PAR for this site.
- 6.20 Further, there was a calculation error in multiplying the vehicle hour saving by the value of time and this miscalculated figure was carried through the remaining calculations, as the calculation was done outside of the PAR. So, a key finding is for MACs to ensure that where possible, monetising calculations are completed within the PAR.
- 6.21 In the original PAR appraisal of journey time impacts, the journey time dis-benefits associated with construction were also considered. The construction dis-benefit was expected to be approximately £600,000. As it is not possible to measure this in the evaluation, the construction impact has been removed from all forecasts and the outturn results. Note that on a scheme forecast to produce £184.9m of journey time benefits, a dis-benefit of £600,000 represents less than 0.5% of the benefits forecast. Therefore the exclusion of construction delays should not detract from the comprehensiveness of this evaluation.
- 6.22 The predicted corrected benefits presented in this section are PAR predicted benefits adjusted to take the seasonality of the M6 into consideration (see Section 4). This has then been converted to a monetised benefit involving three corrections:
- Fixed calculation error;
 - Capitalisation factor based on the 36% growth assumed in the PAR; and
 - VOT that is more representative of weekend traffic (£10.30 instead of £12.86).
- 6.23 An outline of these forecast journey time benefit calculations is shown in Table 6.3.

Table 6.3 – Forecast Journey Time Benefits

	PAR Predicted ¹	Predicted Corrected
Vehicle hours saved in opening yr	235,384	221,525
Value of time in opening yr (per hr, 2002 prices)	£12.86	£10.30
Capitalisation factor	72.056	72.26
VOT benefits in opening yr (disc to 2002)	£2.566m	£1.793m
60 yr VOT benefits (2002 prices, disc to 2002)	£184.892m	£129.592m

6.24 The table demonstrates the seasonality, VOT and correcting the calculation errors has a large impact on the forecast benefits. The first year benefit reduces by just under £800,000 to £1.793m. Over the 60 year assessment period, the effect is exaggerated further, with total benefits reducing by approximately £55m down to £129.6m.

Outturn Journey Time Benefits

6.25 Outturn journey time benefits have been calculated by using JTDB information along the M6 and M55. The full explanation of the method used is described in Section 4, but the findings in brief are summarised as:

- All measurable savings are found on Fridays, Sundays and Bank Holiday Mondays;
- M6 J33-32 southbound is found to have the greatest impact. Journey time reductions are most dramatic on Sunday afternoons, peaking at around 17:00;
- There are no measurable benefits north of J33;
- There are small additional benefits between M6 J32 and J31a as well as on the M55 J1 to M6 merge. However, combined, these road sections only account for 5% of all benefits; and
- In total, 138,456 vehicle hours are calculated as being the observable saving in the opening year.

6.26 The outturn vehicle hour savings have been converted to monetised benefits using the PAR method using the newly calculated, lower VOT. An outline of this calculation is shown in Table 6.4.

Table 6.4 – Outturn Journey Time Benefits

	Outturn
Vehicle hours saved in opening year	138,456
Value of time in opening year (per hour, 2002 prices)	£10.30
Capitalisation factor	72.26
Journey Time benefits in opening year (2002 prices, discounted to 2002)	£1.121m
60 year Journey Time benefits (2002 prices, discounted to 2002)	£80.997m

¹ Note that while the values quoted for PAR predicted are accurate to those on the supporting documents, the mathematics behind the calculations do not follow through. They reflect an error that was carried through the PAR

6.27 The table demonstrates that an observed £1.121m journey time saving has occurred in the opening year. The reforecast 60 year benefits are now thought to be £80.997m. This is approximately £104m less than the PAR forecast and £48.5m less than the Predicted Corrected forecast. The main reasons for this are:

- The Value of Time used to convert vehicle hours to financial benefits has been reduced to reflect the high proportion of leisure trips affected by the scheme;
- Benefits north of M6 J33 were not distinguishable from background noise in the JTDB data used for evaluation. It appears unlikely that the benefits north of J33 were of the magnitude expected;
- AM and PM peak benefits were not evident from the JTDB data used for evaluation. Again, this does not mean there has not been an impact, but it is unlikely that the impact is substantial; and
- The seasonality of the road means that it is difficult to derive one saving per vehicle figure that is attributable all year round. This variability was not fully considered in either of the forecast methodologies though was more accurate in the predicted corrected methodology.

6.28 While the journey time benefits have proven to be less than forecast, the savings are still substantial and demonstrate that the scheme has been a success for journey times. Further, the scheme's objective was to reduce the delays intrinsic to Sunday and Bank Holiday Monday peaks and these have proven to be the time periods that have benefited from the scheme.

Total Present Value Benefits (PVB)

6.29 The reforecast Present Value Benefits (PVB) for the full 60 year assessment period is shown in Table 6.5. The PAR predicted, Predicted Corrected and Outturn figures are all presented in their component safety, journey time and total benefit disaggregates.

Table 6.5 – 60 Year PVB and Component Parts

	PAR	Predicted Corrected (most recent)	Outturn
Opening Year			
Safety Benefits	£0.296m	£0.324m	£0.447m
Journey Time Benefits	£2.566m	£1.793m	£1.121m
Total Benefits	£2.862m	£2.117m	£1.568m
60 Year Benefits			
Safety Benefits	£21.364m	£23.399m	£32.284m
Journey Time Benefits	£184.892m	£129.592m	£80.997m
PVB	£206.256m	£152.991m	£113.280m

6.30 The table demonstrates that the outturn benefits represent 55% of the original PAR predicted figures or 74% of the predicted corrected benefits. The main reason for the difference between predicted and outturn PVB is the journey time savings. While the scheme has been successful in reducing journey times, it is clear that the PAR estimated figures for journey times were optimistic. The corrections explained above are the cause of this difference in journey time benefits and these explain the drop in 60 year PVB. Accident benefits however have been higher than both the PAR predicted and the predicted corrected scenario.

- 6.31 The table does show however that whilst the benefits were not as high as anticipated, the scheme has been successful on both safety and journey time measures and is expected to deliver substantial benefits over the scheme assessment period.

Scheme Costs

- 6.32 The scheme costs for the M6 J32 Southbound Widening scheme are shown in Table 6.6. There were no maintenance costs included in the PAR and so these have equally not been included for the predicted corrected or outturn.
- 6.33 The PAR and Predicted Corrected figures differ due to a known calculation issue within PAR 4.1d associated with discounting. This was the only cause for correction from the PAR predicted figure but does cause the predicted corrected to be 24% higher than PAR predicted cost.
- 6.34 The Outturn spend is higher than the predicted spend, though the inclusion of risk allowance and optimism bias (3%) means that the predicted corrected and outturn costs are reasonably similar (within £60k). The scheme's Outturn cost (in the construction year) was £6.164m (note that the costs shown in Table 6.6 are in 2002 prices, discounted to 2002).
- 6.35 In conclusion, apart from the known PAR4.1d error, the cost forecast appears to have been accurate.

Table 6.6 – Summary of Predicted and Outturn Scheme Costs

	PAR	Predicted Corrected	Outturn
Total Project PVC (2002 prices, disc to 2002)	£3.186m	£3.951m	£4.015m

First Year Rate of Return and Benefit Cost Ratio

- 6.36 The First Year Rate of Return (FYRR) is the ratio of monetised benefits from the first year of a scheme relative to the capital invested in the scheme during construction. Effectively, it informs of how much of the scheme cost is recovered in the first year of the scheme operating. During this one year after evaluation, it is possible to provide an outturn FYRR with some confidence having observed the opening year.
- 6.37 The Benefit Cost Ratio (BCR) for a scheme is the ratio between the monetised 60 year benefits (PVB) and costs (PVC). It informs of how many times the project is likely to pay for itself over the 60 year assessment period. The outturn BCR provided is simply an improved forecast based on the observations of the opening year.
- 6.38 The calculation of FYRR and BCR is shown in Table 6.7.

Table 6.7 – FYRR and BCR Calculations

(Discounted to 2002)	PAR	Predicted Corrected (latest dates)	Outturn
First Year Rate of Return (FYRR)			
Total Benefits in Opening Year	£2.862m	£2.117m	£1.568m
Costs in Opening Year	£3.186m	£3.951m	£4.015m
FYRR	90%	54%	39%
60 Year Benefit Cost Ratio (BCR)			
PVB	£206.256m	£152.991m	£113.280m
PVC	£3.186m	£3.951m	£4.015m
BCR	64.7	38.7	28.2

6.39 The calculation of FYRR and BCR are shown in Table 6.7. The table demonstrates that:

- The PAR predicted that the scheme would produce a FYRR of 90% with a BCR of 64.7;
- For the predicted corrected, the PAR 4.1d error meant that costs were appraised too low. Using the wrong VOT for the journey time benefits decreased these also. The inclusion of accidents on the eastbound M55 increased the predicted accident saving however. Overall, this meant that predicted corrected FYRR was 54% with a BCR of 38.7;
- In the outturn, benefits were lower than expected due to the weekday and south of J32 benefits not materialising. Safety benefits were however higher than anticipated. This meant that the outturn FYRR is recorded as 39% and the reforecast BCR is reduced to 28.2.

6.40 While the scheme is not as successful as expected, a BCR of 28.2 represents excellent value for money and the FYRR suggests that the scheme should return investment costs within three years.

Summary

This section has considered the economy impacts of the M6 J32 Southbound Widening LNMS. It has outlined the monetising of safety and journey time benefits and calculated the overall value for money. Key findings include:

- Safety produces significant financial benefits, with the outturn accident saving higher than both the PAR and predicted corrected scenarios (the latter including M55 eastbound accidents);
- Value of time used was not appropriate for the journey time savings accrued. Correcting this made the forecast much lower, though still financially worthwhile;
- Outturn journey times provide a large financial benefit, though still less than predicted due to the failure to accrue benefits south of J32;
- Cost appraisal was very accurate and only flawed by fault in PAR 4.1d; and
- Overall, it was an exceptionally successful scheme with a FYRR of 39% and forecast to produce a BCR of 28.2 over the 60 year assessment.

7. Environment, Accessibility and Integration

7.1 This section of the report presents information relating to the NATA objectives of environment, accessibility and integration. This information will be compared to the forecasts made in the PAR's Appraisal Summary Table (AST).

Environmental Impacts

7.2 The scheme's predicted and outturn evaluated impacts on the environment have been summarised by each of the sub-objectives in the table below. The sub-objectives have each been scored on a scale from large beneficial to large adverse.

Table 7.1 – Summary of Predicted and Outturn Environmental Impacts

Sub-Objective	Predicted Impact (PAR/AST)	Outturn Impact (EST)
Noise	Neutral	Neutral The traffic volume at this site has changed very marginally, only around 0.5% from the pre-scheme. A 25% change is required for noise to be affected.
Local Air Quality	Neutral	Neutral The scheme's major impact is in the Sunday peak and thus the AADT does not change significantly.
Greenhouse Gases	Neutral	Neutral The scheme has been successful at keeping traffic moving reliably, especially during the Sunday peak. Reducing congestion is likely to have improved greenhouse gas emissions slightly. However, as vehicle kilometres have changed less than 10% as a result of the scheme the scheme has no impact on greenhouse gases.
Landscape	Neutral	Slight Adverse The introduction of new gantry signing is likely to have slightly worsened landscape.
Townscape	Neutral	Neutral The scheme is not in a built up environment and thus townscape is scored as neutral.
Heritage and Historical Resources	Neutral	Neutral There is no impact on archaeological or heritage sites and thus the scheme is scored neutral.

Sub-Objective	Predicted Impact (PAR/AST)	Outturn Impact (EST)
Biodiversity	Neutral	Neutral The project was wholly within the existing highway and so there is no impact on biodiversity.
Water Environment	Neutral	Neutral There has been no change to highway drainage and so the scheme is scored neutral.
Physical Fitness	Neutral	Neutral As a motorway scheme there is no walking or cycling routes affected. Therefore the impact is scored neutral.
Journey Ambience	Large Beneficial The reduction in accidents and congestion will reduce driver stress and improve journey ambience.	Large Beneficial The scheme has successfully reduced accidents along the scheme stretch including the M55. Further, journey times have improved as a result of the scheme and so driver stress will be reduced. Advanced warning signs of the M55 diverge will help reduce stress further.

Accessibility Impacts

- 7.3 The scheme's predicted impacts and outturn evaluated impacts on Accessibility have been summarised by sub-objective in Table 7.2.

Table 7.2 – Summary of Predicted and Outturn Accessibility Impacts

Sub-Objective	Predicted Impact (PAR/AST)	Outturn Impact (EST)
Option Values	Neutral	Neutral There is no public transport impact related to this scheme.
Severance	Neutral	Neutral The scheme has no impact on routes used by pedestrians, equestrians or cyclists.
Access to Transport System	Neutral	Neutral There is no change to the public transport system

Integration Impacts

7.4 The scheme’s predicted impacts and outturn evaluated impacts on Integration have been summarised by sub-objective in the Table 7.3 below.

Table 7.3 – Summary of Predicted and Outturn Integration Impacts

Sub-Objective	Predicted Impact (PAR/AST)	Outturn Impact (EST)
Transport Interchange	Neutral	Neutral The scheme has no change or impact on interchange facilities.
Land Use Policy	Neutral	Neutral The scheme is not referenced in any specific land use policy and is not likely to affect land use policy in any significant way; hence a neutral assessment is awarded.
Other Govt Policies	Neutral	Neutral The scheme provides some support for Government policies aimed at either reducing accidents or congestion. Whilst not referenced in any specific Government Policy, the LTP for Lancashire (2011-2021) makes reference to reducing congestion and improving safety in the county, to which the scheme will contribute. Nonetheless, the scheme is just one of many in the county and hence a neutral assessment is awarded.

Summary

In conclusion, the scheme has been assessed on its impacts on environment, accessibility and integration. The main findings are that:

- The scheme has performed as expected on all but one of the sub-objectives;
- The large beneficial for journey ambience is the greatest success for the widening scheme; and
- The landscape sub-objective was incorrectly scored neutral in the PAR. Guidance states that new signing and gantries should result in an adverse score. As such, this is scored ‘slight adverse’ in the EST.

8. Conclusions and Recommendations

- 8.1 This report presents the POPE of the M6 J32 Southbound Widening LNMS, implemented by Amey Mouchel in 2009.
- 8.2 The report has made use of the best data currently available to evaluate the impact of the scheme and compare this to the pre-scheme conditions and the forecasts for scheme impact presented in the PAR. The purpose of this section is to:
- Summarise the key impacts of the scheme and how these compare to forecasts; and
 - Consider the lessons learnt and make recommendations to improve future LNMS.

Summary of Scheme Impacts

Traffic

- Traffic levels have reduced very marginally (0.5%), but not in line with the nationwide decline suggesting the widening scheme has promoted growth;
- The main periods for journey time benefit have been during the tourism season (April to November) on Fridays, Sundays and Bank Holiday Mondays;
- The scheme saved 138,456 vehicle hours in the opening year. Almost all of this saving came from the road section between J33 and 32 southbound with a small benefit from the M55 and M6 south of J32;
- The forecast benefit to the weekday AM and PM peak was not evident from the data analysed; and
- The overall journey time saving was much lower than anticipated; this was largely due to the benefits south of J32 not accruing to the high level expected.

Safety

- The PAR predicted an accident saving of 4.5 in the opening year. However, this only included accidents on the M6 southbound carriageway and did not include saving any accidents on the eastbound M55 on the approach to M6 J32. The predicted corrected scenario was expanded to include these accidents, thereby increasing the predicted accident saving to 5.64 (when using the PAR dates) and 4.93 when using the most recent data available;
- The actual saving was calculated as 6.8 accidents, approximately 40% higher than the predicted corrected (most recent) accident saving, giving rise to a forecast saving of 560 accidents over 60 years; and
- The STATS19 data tells us that 'slowing, stopping and moving off' accidents have reduced from 5.6 accidents per year pre-scheme to 0 post-scheme. Therefore the scheme appears to have been successful at targeting shunt type accidents associated with queuing.

Economy

- The scheme has been incredibly successful at accruing monetary benefits, there were £1.567m benefits observed in the opening year that are forecast to grow to £113.3m over 60 years;
- The benefits are much less than predicted however, mainly due to the PAR using a value of time (VOT) not appropriate for weekend traffic and the predicted journey time benefits south of M6 J32 not materialising;
- The safety benefits were however higher than expected, with approximately half of the outturn saving coming from the M55 eastbound approach to M6 J32 (which was not included in the PAR appraisal);
- Outturn scheme cost was marginally higher than anticipated at £4.015m. The scheme therefore produced an observed FYRR of 39%, a great return for such a large investment;
- Finally, the forecast BCR is 28.2. To put this in perspective, the average BCR for all Large LNMS evaluated over the last seven years is 9.1. Therefore, this represents an excellent return on investment, even though it is less than anticipated.

Environment, Accessibility and Integration

- The scheme's major impact was on journey ambience which scored as large beneficial. This was due to the reduced fear of accidents related to the reduced accident rate, the reduced stress, due to lower congestion and advanced direction signing, and improved journey times. Overall, the scheme has been very successful;
- There has also been a slight adverse to landscape due to the new gantry signing provided; and
- All other objectives have been scored neutral as predicted. As a motorway scheme there is no change to accessibility or integration as the scheme is entirely contained within the highway boundaries and does not interact with pedestrians, cyclists or public transport.

Scheme Specific Objectives

- 8.3 Drawing on information presented in this report, a summary of the scheme's success against the scheme specific objectives, listed in the introduction to this report, is provided in Table 8.1.

Table 8.1 – Scheme Specific Objectives

Objective	Success	
Eliminate queuing and congestion on the southbound approach to J32	The scheme has had a large impact in reducing delays particularly during the Sunday PM peak. This peaks at as much as 26 minutes per vehicle.	✓
Reduce accidents related to congestion and those related to movements at J32	The accident rate has reduced due to the lower level of congestion and new signage/slip road layout. Further, there have been safety benefits on the M55 approach also.	✓

Appraisal Summary Table (AST) and Evaluation Summary Table (EST)

- 8.4 The Appraisal Summary Table (AST) is a one page summary of the main economic, safety, environmental and social impacts of a highway scheme. Table A.1 in Appendix A presents the AST, duplicated from the PAR, for the M6 J32 southbound widening scheme.
- 8.5 The Evaluation Summary Table (EST) was devised for the POPE process. It is a replica of the AST, adjusted to score the scheme against the NATA objectives based on first year observed findings. This is shown in B.1 in Appendix B.

Recommendations

- 8.6 During the course of this evaluation, a number of findings have revealed ways in which the LNMS appraisal process could be improved. These are summarised in this sub-section of recommendations:
- Care should be taken to ensure all sources of benefit are considered when appraising a scheme. The M6 widening scheme identified that there are often 30 miles of queues on the M6 on Sunday peaks but failed to anticipate that this also meant there were delays to the M55 eastbound traffic. The evaluation uncovered that the M55 also benefited from this scheme with:
 - Journey times reduced on Sundays peaks also on the M55 eastbound between J1 and the M6; and
 - Accidents saved on the M55 eastbound approach to the M6.
 - The journey time analysis in Section 4 identified that the PAR forecast journey time savings had been optimistic because they had failed to consider seasonality. The M6 around J32 is heavily seasonal due to the high level of tourist traffic that uses the route. The PAR had used data from April to September to inform the forecast savings but this coincides with the peak traffic volume. Therefore in future, a representative sample of data should be used to inform forecasts. If this isn't available, seasonality of the site should be considered then forecasting benefits;
 - The value of time (VOT) used to calculate a journey time monetary benefit was the standard PAR figure. However, this is not representative of the tourism traffic that the scheme was aiming to reduce journey times for. These are mainly leisure trips with a lower VOT. Therefore, in future, care should be taken to ensure that the VOT used for monetising is appropriate to the scheme aims; and
 - The PAR failed to note the adverse impacts of the new gantry signing. PAR guidance states that, depending on various factors such as size, location and existing landscape, gantries and signage should score adverse for landscape. It is important this guidance is used to fill the AST.

Appendix A

AST

Table A.1 – AST

Objective	Sub Objective	Qualitative Impacts	Quantitative Measure	Assessment
Environment	Noise	Not applicable	N/A	N/A
	Local Air Quality	Not applicable	N/A	N/A
	Greenhouse Gases	Not applicable		N/A
	Landscape	Not applicable		N/A
	Townscape	Not applicable		N/A
	Heritage of Historic Resources	Not applicable		N/A
	Biodiversity	Not applicable		N/A
	Water Environment	Not applicable		N/A
	Physical Fitness	Not applicable	N/A	N/A
	Journey Ambience	None		Large Beneficial
Safety	Accidents	None	365 Accidents Saved	Accident PVB £20.823m
	Security	Not applicable	N/A	N/A
Economy	Public Accounts	Reliability benefits will accrue from clearer route signing and a reduction in accidents and congestion brought about by the increase in capacity		£3.186m
	Transport Economic Efficiency			
	Reliability	None	All travellers on a Sunday peak period	Slight Beneficial
	Wider Economic Impacts	Not applicable	N/A	N/A
Accessibility	Option Values	Not applicable		N/A
	Severance	Not applicable	N/A	N/A
	Access to the Transport System	Not applicable		N/A
Integration	Transport Interchange	Not applicable	N/A	N/A
	Land Use Policy	Not applicable		N/A
	Other Government Policy			

Appendix B

EST

Table B.1 – EST

Objective	Sub Objective	Qualitative Impacts	Quantitative Measure	Assessment
Environment	Noise	Total flow (ADT) has reduced by around 0.5%. A 25% change is required to demonstrate an impact on noise, small changes scored as 'no impact'	ADT reduced from 61,230 to 60,936	No Impact
	Local Air Quality	Reduced congestion on the M6 is likely to have improved air quality over the scheme extent, especially on Sunday afternoons. However, traffic flow changes of less than 10% are regarded as having 'no impact'	ADT reduced from 61,230 to 60,936	No Impact
	Greenhouse Gases	If the change in distance travelled has changed by less than 10% this is scored as 'no impact'. The scheme did not impact the length of the road, and so traffic volume must have changed by 10% to cause an impact	ADT reduced from 61,230 to 60,936	No Impact
	Landscape	The introduction of gantries and additional gantry signing means that landscape will have been affected. New signage is sufficient to score an impact on landscape. The landscape impact is limited by the fact all works were within highway boundary.	-	Slight adverse
	Townscape	This scheme is not in a built up environment and so townscape is not impacted	-	No Impact
	Heritage of Historic Resources	There are no archaeological or heritage sites affected by the scheme	-	No Impact
	Biodiversity	The project was wholly within the existing highway boundary and so there is no impact on biodiversity	-	No Impact
	Water Environment	There has been no change to the highway drainage	-	No Impact
	Physical Fitness	As a motorway based scheme there are no walking or cycling routes affected	-	No Impact
	Journey Ambience	The scheme has successfully reduced accidents, journey times and congestion and provided advanced direction signing. Therefore the fear of accidents and driver stress will be reduced	Journey times decreased by up to 26 min per veh	Large Beneficial
Safety	Accidents	The scheme has successfully reduced accidents on the M6, the M55 and has specifically targeted shunt type accidents	6.8 accidents saved in the opening year	Beneficial (higher than expected) PVB £32m
	Security	Reduced queuing may have helped improve security, however, due to the location of the scheme on a motorway it was likely to be low risk prior to the scheme	-	No Impact
Economy	Public Accounts	The costs were higher than expected	PVC £4m	PVC £4m (more than expected)
	Transport Economic Efficiency	Journey times have been substantially decreased, especially on the targeted Sunday peak period. Reductions are particularly evident between the tourism season (April to November) on Sunday and Bank Holiday Monday afternoons. This peaks at a 26 minute per vehicle benefit on the M6 between J33 and J32 southbound	Journey Time Benefit PVB £81m	Beneficial (lower than expected) PVB £81m
	Reliability	Reduced congestion on the M6 will result in more reliable journey times	-	Beneficial
	Wider Economic Impacts	The project has not been identified as within a regeneration area	-	No Impact
Accessibility	Option Values	As the scheme is on the motorway, the scheme has not impacted on public transport options	-	No Impact
	Severance	The scheme has not had an impact on routes used by pedestrians, equestrians or cyclists	-	No Impact
	Access to the Transport System	There is no change to the public transport system due to the scheme	-	No Impact
Integration	Transport Interchange	The scheme has no impact on interchange facilities	-	No Impact
	Land Use Policy	The PAR mentions no Regional Transport Strategies, Local Transport Plans or any other local planning guidance for the scheme to be measured against	-	No Impact
	Other Government Policy			