

LNMS Evaluation Report

A45/A509 Wilby Way Junction Segregated Left Turn Lane (SLTL)




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Contents

<i>Section</i>	<i>Page</i>
1. Introduction	1
Background	1
Context	1
Purpose of this Report	1
The Study Area	2
The Problems	2
Scheme Description	3
Scheme Categorisation and Objectives	3
PoPE Methodology Overview	4
Report Structure	4
2. Scheme Detail	6
Introduction	6
Measures Implemented	6
3. Data Collection and Stakeholder Feedback	10
Introduction	10
Summary of Site Observations	10
Datasets Used to Support the POPE Evaluation	10
Pre Scheme Opening Data	10
Post Scheme Evaluation Data	11
Stakeholder Feedback	11
4. Traffic and Economic Impacts	13
Introduction	13
Traffic Trends	13
Economic Efficiency	15
Scheme Costs	15
Journey Time Savings	16
5. Safety Impacts	21
Introduction	21
PAR Analysis and Assumptions	21
Post Opening Evaluation (POPE)	22

Accident Causation Factors	23
Accident Clusters	23
6. Environmental, Accessibility and Integration Impacts	26
Introduction	26
Impacts on The Environment	26
Accessibility Impacts	28
Integration	28
7. Summary and Conclusions	30
Introduction	30
Summary of Key Impacts	30
Economy	31
Safety	31
Environment	31
Accessibility	31
Integration	32
Conclusions	32
Recommendations	32
APPENDIX A – Appraisal Summary Table (AST)	33
APPENDIX B – Evaluation Summary Table (EST)	36
APPENDIX C – Glossary	38
List of Tables	
Table 4.1 - Variations in Traffic Flow between 2005 and 2008 by Arm	13
Table 4.2 - Summary of Predicted and Outturn Scheme Costs	16
Table 4.3 - ARCADY Modelled ‘Before’ and ‘After’ Scheme Opening Delays	17
Table 4.4 - Observed Average ‘Before’ and ‘After’ Scheme Opening Journey Times	19
Table 4.5 - Comparison of Predicted and Outturn Economic Benefits	20
Table 5.1 – Pre and Post Scheme Opening Accident Summary	23
Table 5.2 – Comparison of PAR, PAR Predicted Corrected and Outturn Accident Analysis	25
Table 6.1 – Summary of Predicted and Outturn Environmental Impacts	26
Table 6.2 - Summary of Predicted and Outturn Accessibility Impacts	28
Table 6.3 – Summary of Predicted and Outturn Integration Impacts	28
Table 7.1 – Summary of Scheme Benefits (Predicted, Predicted Corrected and Outturn)	30
List of Figures	
Figure 1.1 - Location of Scheme	2
Figure 2.1 - Summary of Improvements Implimented	6

Figure 2.2 - A45 Westbound Entry 'Before' and 'After' Scheme Opening (Looking East)	7
Figure 2.3 - A45 Westbound Exit 'Before' and 'After' Scheme Opening (Looking South West)	7
Figure 2.4 - Pedestrian Crossing Improvements	8
Figure 2.5 - New Signing on the A45 Westbound	8
Figure 2.6 - Tree Planting	8
Figure 3.1 - Journey Time Run Locations	11
Figure 4.1 - Turning Count Data	14
Figure 4.2 - Potential Rat-Run Route	15
Figure 4.3 – Summary of Outturn Impacts	19
Figure 5.1 – Before Opening Accident Locations (2002 – 2007)	24
Figure 5.2 - After Opening Accident Locations (2008)	24

1. Introduction

BACKGROUND

CONTEXT

- 1.1 Due to the heavy congestion and a poor safety record the A45/A509 Wilby Way junction was pronounced a Junction Priority Action Site (JPAS) in 2002. This programme of small-scale junction improvements (<£5m) was aimed at reducing congestion and improving safety at junctions across the Highways Agency's motorway and trunk road network. All schemes within the programme are rigorously assessed in terms of their value for money before any improvement work is undertaken.
- 1.2 The scheme construction at the A45/A509 Wilby Way junction began in August 2007 and the on-carriageway elements of the scheme opened on 11th December 2007 with some off-carriageway landscaping improvements continuing until 11th January 2008. The scheme was primarily designed to reduce the excessive queuing on the A45 westbound approach during peak times.

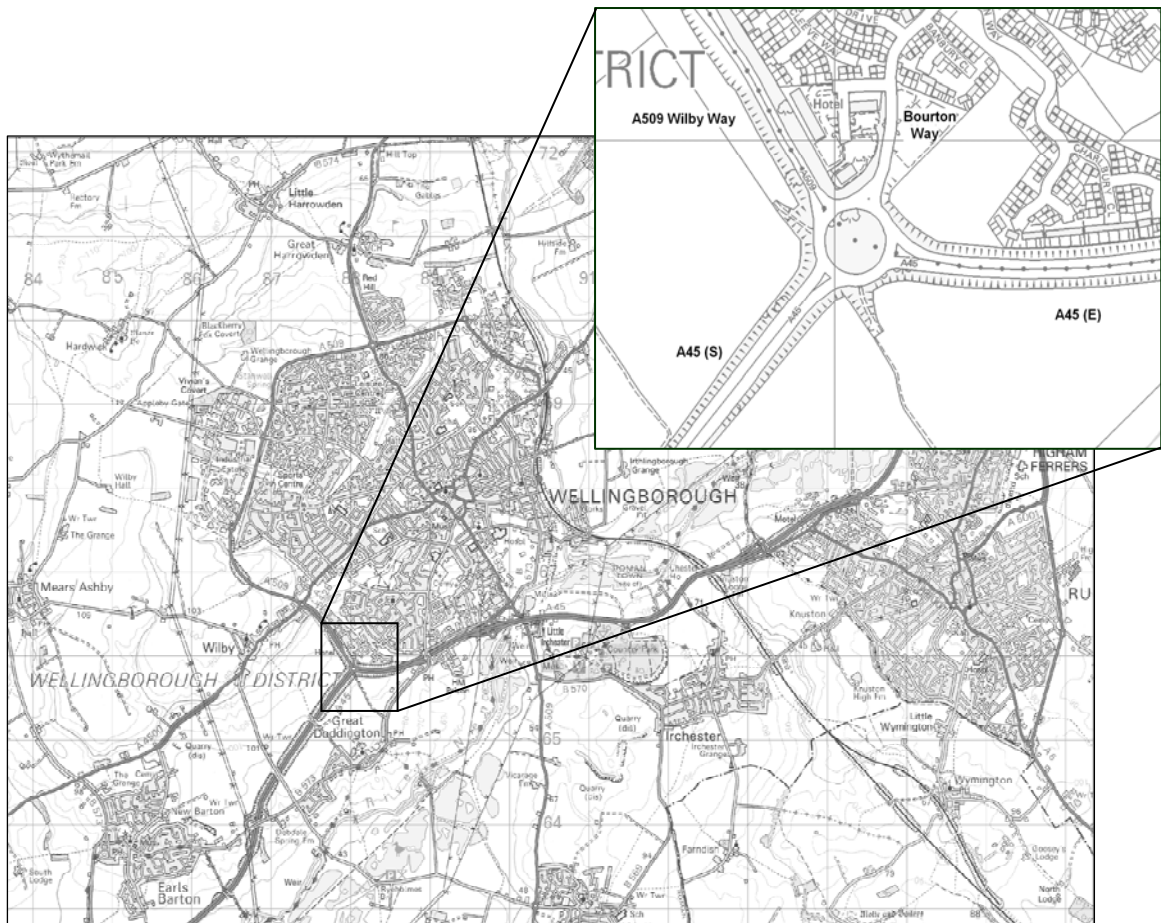
PURPOSE OF THIS REPORT

- 1.3 As part of an ongoing requirement of the Highways Agency (HA) to evaluate the impacts of trunk road schemes, Atkins has been commissioned to undertake post-opening evaluations of Local Network Management Schemes (LNMS) with an implementation cost of between £1m and £5m. The aim of this process is to assist the HA and their Managing Agents to:
 - ◆ Quantify the outturn benefits and disbenefits 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; and
 - ◆ Enable that 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.
- 1.4 This document specifically sets out the results of the Post Opening Project Evaluation (POPE) of the A45/A509 Wilby Way Roundabout Segregated Left Turn Lane (SLTL) Scheme as implemented in December 2007. More specifically, the report examines the economic and safety impacts resulting from the improvements, with consideration also given to the main environmental, accessibility and integration impacts.

THE STUDY AREA

- 1.5 The A45 Wilby Way Roundabout is located approximately 1 mile south west of Wellingborough centre (**Figure 1.1**) and along with the A509 forms the south western side of Wellingborough Ring Road.
- 1.6 The scheme is located in the County of Northamptonshire and lies wholly within Highways Agency Area 8.

Figure 1.1 - Location of Scheme



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THE PROBLEMS

- 1.7 Prior to the scheme opening, the problems identified at the Wilby Way roundabout were:
 - ◆ Long delays during peak periods on approaches to the roundabout;
 - ◆ An accident history associated with the build up of static queuing on the approach to the junction; and
 - ◆ Accidents associated with conflicting traffic movements on the roundabout.

SCHEME DESCRIPTION

- 1.8 The A45/A509 Wilby Way scheme involved the following improvement measures:
- ◆ A Segregated Left Turn Lane (SLTL) free flow link on the A45 westbound approach to the junction;
 - ◆ Reduction of the A45 westbound approach to the roundabout to a single lane to reduce conflict at the junction;
 - ◆ Improved pedestrian facilities; and
 - ◆ New signing and lining.
- 1.9 Other options considered but discounted included:
- ◆ The provision of an additional SLTL between the A45 eastbound and the A509 (Wilby Way). This option was discounted as it was found, following junction modelling that this scheme would have less benefits than the one implemented;
 - ◆ A45 eastbound widening work was removed from the scheme as the work would be abortive by an impending Section 278 agreement¹. To date this work has not been completed.
 - ◆ Westbound SLTL and flyover eastbound. The HA's Route Manager did not wish to proceed with this proposal due to the number of Departures from Standards required.
 - ◆ To avoid land acquisition, a scheme that widened both of the A45 approaches to the roundabout from two to three lanes was investigated. The modelling showed that the benefits over the 'Do nothing' were very small and would be lost by 2008.

SCHEME CATEGORISATION AND OBJECTIVES

- 1.10 Local Network Management Schemes (LNMS) are categorised according to which of the five assessment objectives of safety, economy, environment, accessibility and integration are primarily addressed by the scheme. As detailed in the Project Appraisal Report (PAR) document, the scheme has been categorised as an **economy scheme**. The scheme was expected to achieve the following outcomes:
- ◆ Achieve significant reductions in the delays to traffic at peak times at the roundabout;
 - ◆ Improve safety by minimising conflicting movements within the roundabout and reducing the period of queuing;
 - ◆ Achieve reliability on the route by consistently reducing varying delays at the junction;
 - ◆ Improve journey ambience by reducing queuing and reducing the fear of potential accidents;

¹An Agreement between a developer and the Highway Authority where a development requires works to be carried out on the highway to mitigate its impacts.

- ◆ Provide pedestrian crossing points on the A45 to reduce severance;
- ◆ Improve air quality in the vicinity of the junction by reducing queuing traffic; and
- ◆ Enhance the movement of traffic in the Wellingborough area with regards to Land Use policy, and also assist with the policies of the Growth Area Agenda for the South Midlands.

POPE METHODOLOGY OVERVIEW

1.11 This report provides an overview of the forecast and outturn impacts of the A45/A509 Wilby Way 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.

1.12 More specifically, this report presents the following:

- ◆ A comparison of the 'before' and 'after' traffic volumes and journey times at the junction 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 Managing Agent Contractor (MAC) and Highways Agency Project Sponsor;
- ◆ 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 scheme opening.

REPORT STRUCTURE

1.13 The remainder of this report has been divided into six further sections as follows:

- ◆ **Section 2 - Scheme Detail:** Provides details of the scheme including photos illustrating the schemes key features;

- ◆ **Section 3 - Data Collection and Stakeholder Feedback:** Contains an outline of the data used to evaluate the scheme, and the responses from key stakeholders regarding the scheme;
 - ◆ **Section 4 - Traffic and Economic Impacts:** Outlines the traffic changes in the study area, as well as the economic impacts of the scheme in respect to predicted and outturn works costs, traffic volume changes and journey delay analysis;
 - ◆ **Section 5 - Safety Impacts:** Outlines the safety impacts of the scheme through analysis of personal injury accidents;
 - ◆ **Section 6 - Environmental, Accessibility and Integration Issues:** Summarises the scheme impacts on these issues; and
 - ◆ **Section 7 - Summary of Findings and Recommendations:** Summarises the impact of the scheme based on the data available to evaluate the scheme.
- 1.14 It is intended that the findings from this report will feed into a wider summary of the outcomes of the POPE process as reported in the LNMS annual report.

2. Scheme Detail

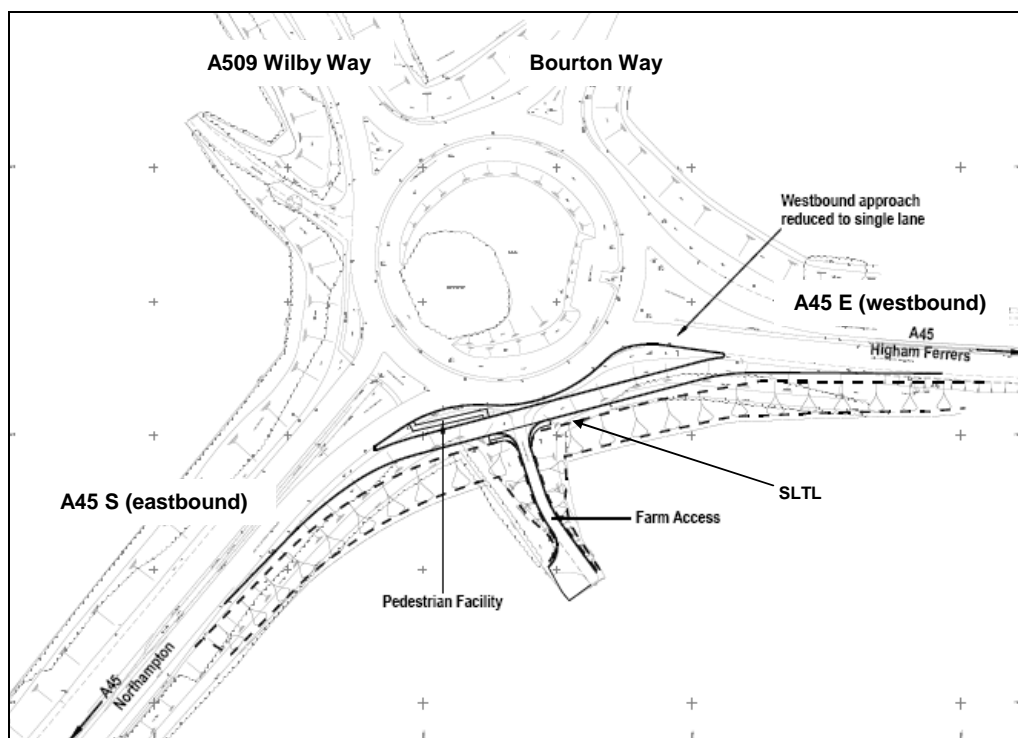
INTRODUCTION

- 2.1 This section of the report examines the details of the scheme and compares the pre and post opening scheme layout. The specific aims of this section are to identify and provide further details of the measures implemented as set out in **Section 1**.

MEASURES IMPLEMENTED

- 2.2 As described in Section 1.7 of this report, the improvements implemented at the roundabout include:
- ◆ A Segregated Left Turn Lane (SLTL) free flow link on the A45 westbound approach to the junction;
 - ◆ Reduction of the A45 westbound approach to the roundabout to a single lane to reduce conflict at the junction;
 - ◆ Improved pedestrian facilities; and
 - ◆ New signing and lining.
- 2.3 **Figure 2.1** illustrates some of these improvements, followed by further details of each.

Figure 2.1 - Summary of Improvements Implimented



Source: Carillion URS

Segregated Left Turn Lane (SLTL)

- 2.4 The SLTL removes from the roundabout circulatory, the A45 westbound traffic heading towards Northampton. This traffic amounts to approximately 80% of the traffic on the A45 westbound arm of the junction. Consequently the westbound entry to the junction has been reduced to a single lane for traffic heading in the direction of Kettering (**Figure 2.2** and **2.3**):

Figure 2.2 - A45 Westbound Entry 'Before' and 'After' Scheme Opening (Looking East)

'Before' Opening



'After' Opening



Figure 2.3 - A45 Westbound Exit 'Before' and 'After' Scheme Opening (Looking South West)

'Before' Opening



'After' Opening



Pedestrian Facilities

- 2.5 To mitigate the adverse effect of the SLTL on pedestrians, provision is made for the minor realignment of the public footpath at the existing crossing point with the addition of signs and road markings to make a safe and distinctive crossing point. **Figure 2.4** illustrates these improvements.

Figure 2.4 - Pedestrian Crossing Improvements



Signing and Lining

- 2.6 Signing and lining has been introduced on approach to the junction and on the circulatory carriageway to reduce route uncertainty.

Figure 2.5 - New Signing on the A45 Westbound



Tree Planting

- 2.7 In order to blend the improvements into the landscape and to replace those removed to make way for the SLTL, a number of trees have been planted as illustrated in **Figure 2.6**.

Figure 2.6 - Tree Planting



Summary – Section 2:

- ◆ The scheme appears to have been implemented as per the proposals set out in the Implementation PAR.

3. Data Collection and Stakeholder Feedback

INTRODUCTION

- 3.1 This Section sets out the data collection process used to support this scheme evaluation. More specifically this chapter:
- ◆ Lists the datasets used to undertake the scheme POPE assessment;
 - ◆ Summarises the outcomes of a site visit undertaken by Atkins in February 2009; and
 - ◆ Provides a summary of the feedback from the MAC and Project Sponsor, and any other interested parties regarding the overall effectiveness of the scheme in achieving the intended objectives.

SUMMARY OF SITE OBSERVATIONS

- 3.2 A site visit was conducted at the junction on the afternoon of 25th February 2009 and the morning of the 26th February 2009 during the network peak periods. The aims of the site visit were as follows:
- ◆ To ensure that the scheme was implemented as per the PAR and scheme drawings supplied by the MAC; and
 - ◆ To observe the post opening junction operating conditions during the peak periods with regards to traffic flow and safety.
- 3.3 The following observations were made during the site visit:
- ◆ The free flow lane on the A45 westbound was operating well with minimal queuing observed at the roundabout in the AM and PM peaks;
 - ◆ Significant queuing was observed on the A45 eastbound in the AM and PM peaks with rolling queues stretching back approximately 1.7km and journey times of up to 8½ mins;
 - ◆ Minimal queuing on A509 Wilby Way with queues predominantly in the off side lane (right turning traffic to the A45 westbound); and
 - ◆ No pedestrians were observed using the crossing of the A45 throughout the duration of the site visit and it was considerably difficult to cross the carriageway due to the volume and speed of vehicles using the SLTL.

DATASETS USED TO SUPPORT THE POPE EVALUATION

- 3.4 The datasets used to inform the 'before' and 'after' comparisons made in this POPE study are as follows:

Pre Scheme Opening Data

- ◆ Pre opening Personal Injury Accident (PIA) data (June 2002 - July 2007);
- ◆ Full turning count survey (12hr) for the Wilby Way junction before opening (November 2005); and

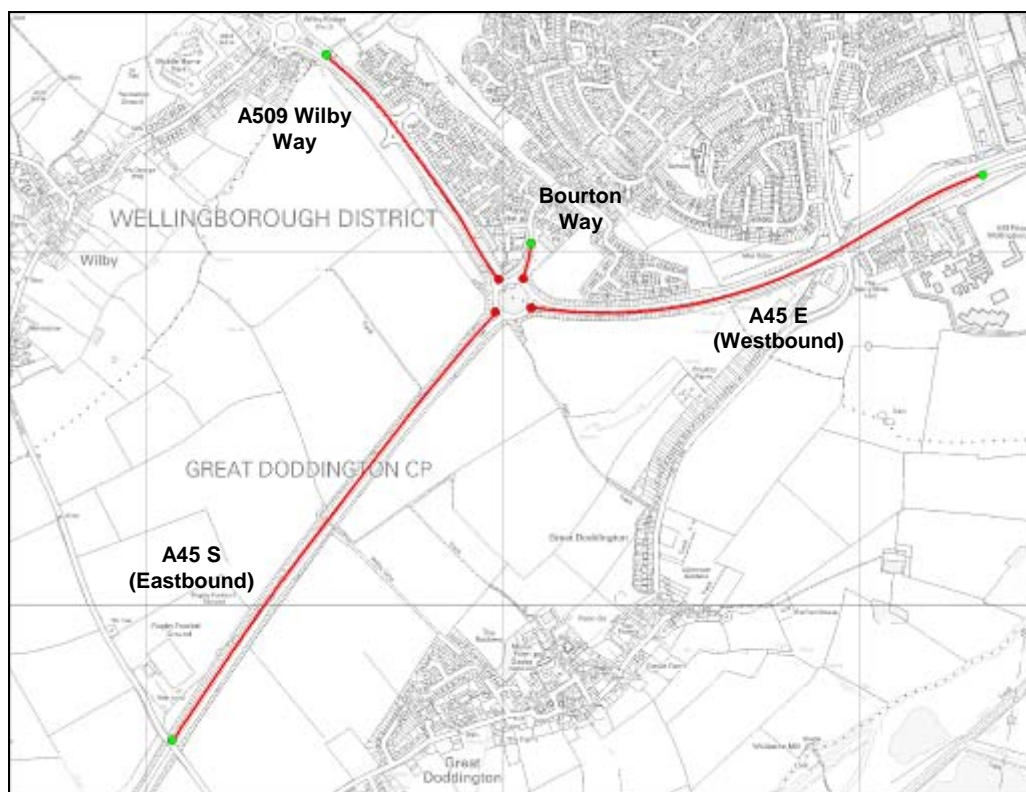
- ◆ Global Positioning System (GPS) journey time surveys for all approaches undertaken prior to the scheme opening (January 2005).

Post Scheme Evaluation Data

- ◆ Post opening PIA data (January 2008 – December 2008);
- ◆ Full turning count survey (12hr) for the Wilby Way junction after opening (June 2008); and
- ◆ GPS journey time surveys for all approaches undertaken post scheme opening (June 2008).

- 3.5 In order to extrapolate the journey time data from the GPS files and ensure a like-for-like comparison of journey time data, all GPS points were plotted in MapInfo GIS software. For each run, the same start point was chosen with the end point represented by the roundabout give-way line. The journey time start and end points used for both the before and after surveys are illustrated in **Figure 3.1**:

Figure 3.1 - Journey Time Run Locations



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STAKEHOLDER FEEDBACK

- 3.6 Feedback was sought from the following stakeholders:
- ◆ Highways Agency Project Sponsor; and
 - ◆ Managing Agent (Area 8).

Project Sponsor

- 3.7 The Project Sponsor for the scheme provided feedback from the public on the scheme from the Highways Agency Information Line (HAIL).
- 3.8 Since opening in December 2007, the following observations have been reported. It should be noted that these comments are the opinions of the public and should be considered as anecdotal evidence only:
- ◆ Extensive queuing on the eastbound approach to the roundabout while westbound approach is clear;
 - ◆ The length of queue on the A45 eastbound adds 10mins to daily commute;
 - ◆ 25 minute delay reported when exiting from Bourton Way;
 - ◆ Westbound movement for journey to work - new layout has improved journey time by 20mins a day; and
 - ◆ Due to queuing on eastbound approach, vehicles are using the local road through the village of Great Doddington as a rat-run to avoid the queues. This has resulted in an increase in the volume of traffic through the village.
- 3.9 The main points to note from the public feedback are that:
- ◆ The westbound approach is much improved, whereas the eastbound approach suffers from extensive queuing; and
 - ◆ Vehicles are using Great Doddington as a rat-run to avoid the eastbound queues.

Managing Agent

- 3.10 It was considered by the MAC that the SLTL has been operating satisfactorily. There is anecdotal evidence that suggests that eastbound A45 queuing has increased slightly in peak periods. According to the MAC, this is due to A45 east (westbound) to A509 movements being compressed into a shorter period as a result of reduced queuing on the westbound approach. This increased throughput of traffic on the A45 westbound arm results in fewer gaps in which A45 eastbound traffic can join the circulatory carriageway.

Summary – Section 3:

- ◆ The stakeholder feedback suggests:
 - the SLTL is operating as expected and has reduced delay on the A45 westbound;
 - eastbound A45 queuing increasing in peak periods; and
 - Due to queuing on eastbound approach, vehicles are using the local road through the village of Great Doddington as a rat-run to avoid the queues
- ◆ On site observations verify the information provided by stakeholders.

4. Traffic and Economic Impacts

INTRODUCTION

- 4.1 This section summarises the economic impacts of the scheme and includes:
- ◆ An assessment of the scheme's outturn costs;
 - ◆ An examination of the analysis used in the PAR to predict the post opening journey time savings;
 - ◆ Details of the post opening evaluation methodology used to evaluate the schemes impacts; and
 - ◆ An assessment of the level of economic benefits predicted for the scheme and a comparison of these predictions with actual benefits accrued when considering outturn traffic volume changes and journey time benefits.

TRAFFIC TRENDS

- 4.2 Traffic volume changes are examined in order to ensure that benefits/disbenefits of the scheme are attributed solely to the improvements made on the link and not a result of background changes in traffic volumes during the assessment period. Furthermore, such analysis helps to identify whether any traffic has been re-assigned to/from the junction as a result of its enhancements.

Turning Count Comparisons

- 4.3 Full turning counts were undertaken in November 2005 (pre opening) and June 2008 (post opening) for the AM (08:00-09:00) and PM (17:00-18:00) peak periods.
- 4.4 It is noted that there is a seasonal difference in when the counts were undertaken. As such TRADS sites 2037 and 2036 on the A45 (6 miles to the north east of the junction) have been used to establish this seasonal variation in traffic flow. The results show that on average between 2003 and 2008 the two-way AADT traffic flows were 1.1% lower in November compared to June. This is not considered to be significant and given that more local seasonal traffic data is not available the flows have not been adjusted.

Table 4.1 - Variations in Traffic Flow between 2005 and 2008 by Arm

AM Peak (08:00 - 09:00)					
Year	A45 (S)	Wilby Way	Bourton Way	A45 (E)	TOTAL
2005	1927	936	384	1749	4996
2008	1660	959	233	2406	5258
<i>2005 - 2008</i>	<i>-14%</i>	<i>2%</i>	<i>-39%</i>	<i>38%</i>	<i>5%</i>
PM Peak (17:00 - 18:00)					
Year	A45 (S)	Wilby Way	Bourton Way	A45 (E)	TOTAL
2005	1725	1008	239	1872	4844
2008	1574	1032	215	2100	4921
<i>2005 - 2008</i>	<i>-9%</i>	<i>2%</i>	<i>-10%</i>	<i>12%</i>	<i>2%</i>

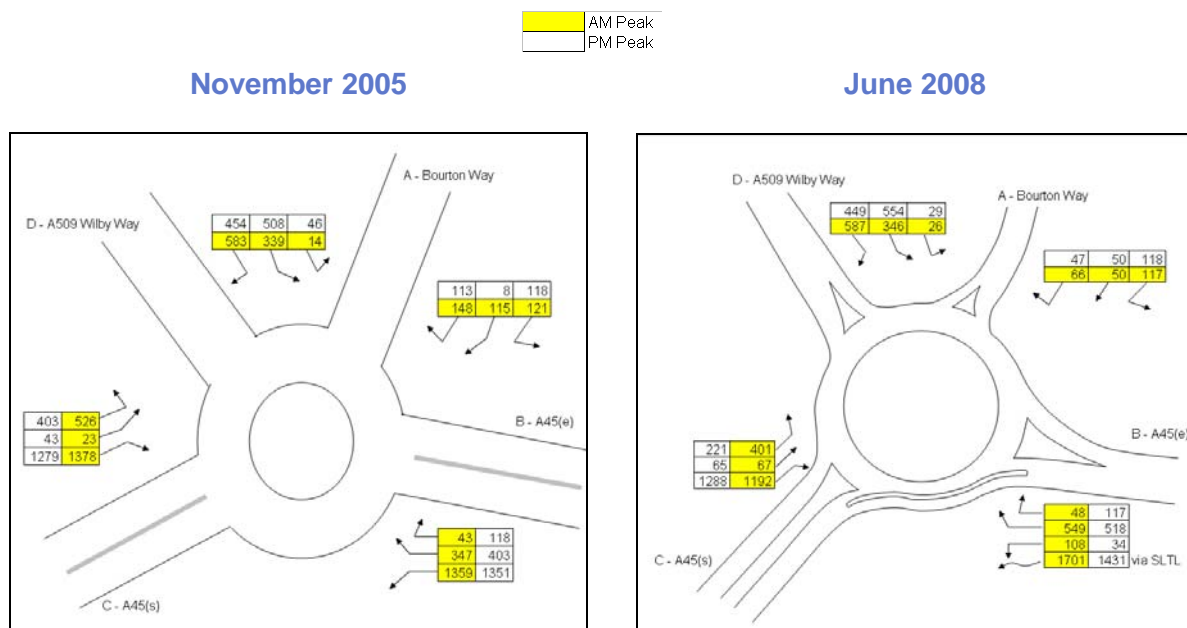
Note: Data from Manual Counts in June 2008 and November 2005. Flows represent inbound flows only.

4.5 **Table 4.1** shows that:

- ◆ Total traffic using the junction in the AM and PM peak periods has increased by 5% and 2% respectively between 2005 and 2008;
- ◆ A comparable national average obtained from NRTF central growth traffic forecasts estimates a growth of 4.8% for the same period. This indicates that local traffic is likely to have increased broadly in line with NRTF estimates;
- ◆ Traffic on the A45 (S) arm has reduced by 14% and 9% in the AM and PM peaks;
- ◆ Traffic on the A45 (E) arm has increased by 38% in the AM peak and 12% in the PM peak.

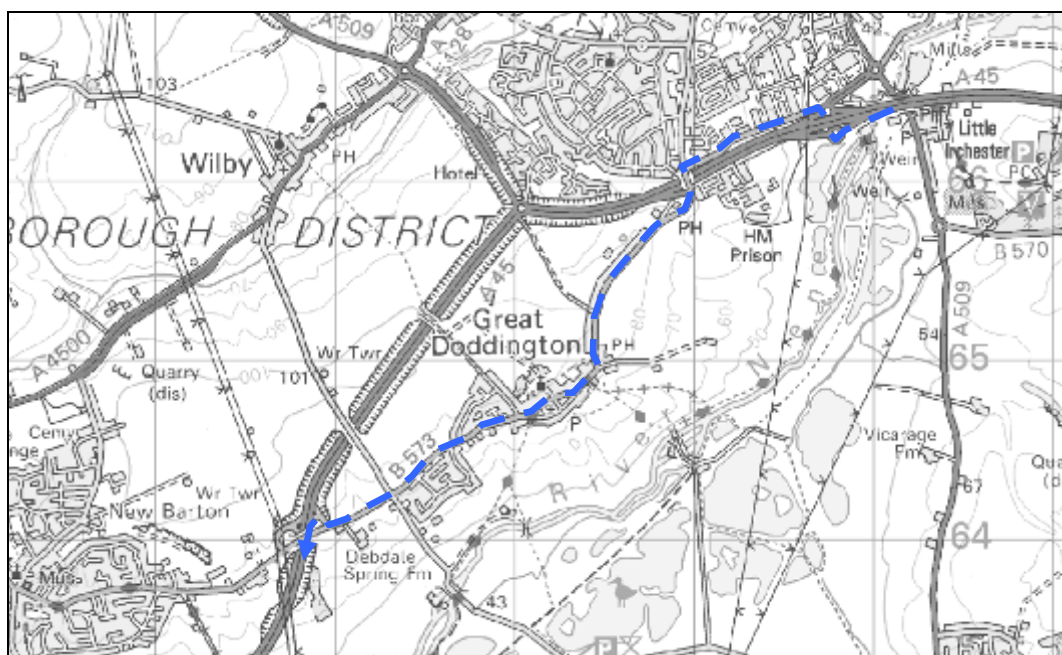
4.6 **Figure 4.1** provides an illustrated comparison of the 2005 and 2008 turning count data. Analysis of this data reveals that the total traffic turning left from the A45 towards Northampton in the AM and PM peak hours has increased from 1359 to 1809 (a 33% increase) in the AM peak and 1351 to 1465 (an 8% increase) in the PM peak.

Figure 4.1 - Turning Count Data



4.7 The increase in traffic on the A45 westbound arm is likely to be re-assigned traffic that has been attracted to the link following the improvements at the junction. Whilst there is no traffic data to verify it, it is believed that, due to queuing on westbound approach, vehicles were using the local road (B573) through the village of Great Doddington as a rat-run (**Figure 4.2**). Since the improvements, these vehicles appear to have been attracted back to the junction.

Figure 4.2 - Potential Rat-Run Route



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ECONOMIC EFFICIENCY

SCHEME COSTS

- 4.8 **Table 4.2** provides a breakdown of predicted and outturn scheme costs. This table demonstrates that the scheme had a predicted total PVC of £1.673m (2002 prices, discounted to 2002 at 3.5%). This included an optimism bias adjustment of 3%, 60 year maintenance costs of £0.073m and a risk allowance of £0.201m.
- 4.9 A predicted corrected cost was calculated to reflect the use of actual Retail Price Index (RPI) values as per the National Government Statistics. This differs from the PAR which used RPIs derived from PAR guidance to derive the costs. The PAR predicted corrected total PVC is £1.888m (2002 prices, discounted to 2002 at 3.5%). This included an optimism bias adjustment of 3%, 60 year maintenance costs of £0.073m and a risk allowance of £0.201m.
- 4.10 The outturn cost of the scheme was £1.664m (2002 prices, discounted to 2002 at 3.5%). This included 60 year maintenance costs of £0.060m. It should be noted that National Government Statistics RPIs have been used when calculating the outturn costs as per the PAR predicted corrected. This allows a like for like comparison between outturn and predicted corrected costs.
- 4.11 The PAR and PAR predicted corrected Works, Land & Other PVC (discounted to 2002 at 3.5% discount rate) include a general taxation factor of 1.209. In the outturn scenario it is assumed that tax is included in the total works cost.

- 4.12 **Table 4.2** indicates that the outturn scheme cost is £0.224m lower than the predicted corrected cost of the scheme.

Table 4.2 - Summary of Predicted and Outturn Scheme Costs

Costs	PAR Predicted	PAR Predicted Corrected	Outturn
Total Works Cost	£1.218m	£1.411m	£1.498m
Total Land Costs	£0.020m	£0.021m	£0.020m
Site Preparation Costs	£0.025m	£0.029m	£0.262m
Site Supervision Costs	£0.062m	£0.072m	£0.125m
Risk Allowance	£0.201m	£0.201m	-
Optimism Bias Adjustment	£0.046m	£0.052m	-
Total Project Costs Undiscounted	£1.571m	£1.784m	£1.905m
Works, Land & Other PVC (<i>discounted to 2002 at 3.5% discount rate</i>)	£1.599m*	£1.816m*	£1.604m**
Maintenance PVC	£0.073*	£0.073*	£0.060**
Total Project PVC (inc. maintenance costs)	£1.673m	£1.888m	£1.664m

Note: All costs in 2002 Prices, PVC in 2002 prices discounted to 2002 at 3.5% discount rate

*Includes general taxation factor of 1.209

**Assumes tax is included in total works costs

JOURNEY TIME SAVINGS

PAR Predictions and Assumptions

- 4.13 The PAR predicted that there would be significant economic efficiency benefits resulting from this scheme. It stated that due to the improvements to the junction, capacity would increase and therefore journey times would improve due to a reduction in queuing.
- 4.14 The PAR assessment for the junction improvements was undertaken by URS Carillion. ARCADY modelling software was used to estimate the journey time benefits that would result from the scheme in the opening year. The PAR made the following assumptions for forecasting the economic impacts of the scheme:
- ◆ First year and 60 year impacts were calculated for the AM and PM peak periods only;
 - ◆ The JUICE (Junction User Interface Cost Evaluation) program was used to derive the first year and 60 year benefits of the proposed scheme options;
 - ◆ Traffic was assumed to grow according to TEMPRO for Northamptonshire, however specific development traffic was also included within this. This growth

amounts to 28% over the 60 year assessment period (opening year to final assessment year);

- ◆ The traffic input for the JUICE model was taken from the base traffic matrices for 2007 as developed for ARCADY;
 - ◆ The same traffic growth rates were input as those used to create the ARCADY matrices;
 - ◆ Delay information was taken from the ARCADY outputs, capped to 5 minutes where necessary; and
 - ◆ In order to model the SLTL, left turning A45 westbound traffic was removed from the matrices in JUICE. This assumed that the traffic was subjected to zero delay and the small geometric delay that would occur was ignored.
- 4.15 It is important to note that the base ARCADY model was calibrated against observed queue lengths however even after calibration, the model was overestimating the queues and delay. This was most apparent on the A45 westbound in the AM Peak (observed queue 100, modelled queue 256) and A45 eastbound in the PM Peak (observed queue 108, modelled queue 308).
- 4.16 **Table 4.3** provides a summary of the PAR predicted delay benefits and disbenefits for the AM and PM peak periods.

Table 4.3 - predicted 'Before' and 'After' Scheme Opening Delays

Roundabout Approach	Before		After		Difference	
	AM	PM	AM	PM	AM	PM
A45 Eastbound	01:49	10:51	02:38	05:19	-00:49	05:32
A45 Westbound	10:19	03:13	00:10	00:14	10:09	02:59
Bourton Way	00:58	00:06	02:17	00:07	-01:19	-00:01
A509 Wilby Way	05:10	06:11	02:00	05:13	03:10	01:02

Note: Average delays in mins/veh with 2007 flows. Negative values represent disbenefits.

- 4.17 Key points to note from **Table 4.3** include:
- ◆ Significant benefits were predicted for the A45 eastbound arm in the PM peak with slight disbenefits in the AM peak;
 - ◆ Significant benefits predicted for the A45 Westbound arm in the AM peak and to a lesser extent in the PM peak;
 - ◆ Marginal disbenefits on Bourton Way; and
 - ◆ Benefits on Wilby Way in the AM peak and to a lesser extent in the PM peak.
- 4.18 It should be noted that due to the overestimate of queuing and delay in the base model brought about by insufficient calibration, the benefits on the A45 approaches are also likely to have been overestimated.
- 4.19 In summary, the assessments of the roundabout performance were calculated by removing A45 east to A45 west movements that are diverted via the SLTL. The outcome of the PAR appraisal was that:

- ◆ Predicted total number of vehicle hours saved on all arms in the opening year was 249,493; and
- ◆ The value of time saved in the opening year was predicted at £2.586m (2002 prices). This translates to a scheme life saving (60 years) of £130.489m (2002 prices, discounted to 2002).

Predicted Corrected Journey Time Benefits

- 4.20 In order to ensure that a like-for-like comparison of the predicted and outturn economic impact can be made, a PAR predicted corrected appraisal of the scheme economic benefits has been undertaken. This was to ensure that the predicted and outturn scheme impacts are considered where possible, using a like for like approach.
- 4.21 More specifically the PAR predicted corrected was completed to assess the scheme benefits for the 60 year assessment using capitalisation factors as detailed in the PAR guidance rather than using JUICE as per the PAR appraisal.
- 4.22 The PAR predicted corrected journey time saving equates to a total vehicle hour saving in the opening year of 249,493 hours, as per the PAR. In contrast to utilising the JUICE program, using the PAR guidance capitalisation factor this saving equates to £122.6m over 60 years and £2.57m in the opening year.

Outturn

- 4.23 The re-evaluation of scheme benefits uses observed outturn journey time data. In order to ascertain the outturn total number of vehicle hours saved in the opening year, analysis has been undertaken using before and after opening observed traffic conditions and not ARCADY modelled data as used in the PAR.
- 4.24 Observed data provides a much more accurate representation of actual traffic conditions compared to modelled outputs. The analysis distributes impacts such that each vehicle entering the junction at a particular arm will accrue a share of the benefits and disbenefits incurred on the arm from which it approaches.
- 4.25 The growth over the period as stated in the PAR is considered to be robust and as such this growth rate has been used in the outturn assessment.
- 4.26 A summary of the outturn AM and PM peak hour journey time savings is given in **Table 4.4**. It should be noted that this table represents journey times and not delays as in **Table 4.3**. As such this data is not directly comparable and should not be treated as such.
- 4.27 **Figure 4.3** presents an illustrated summary of outturn scheme impacts on journey times and traffic flow.

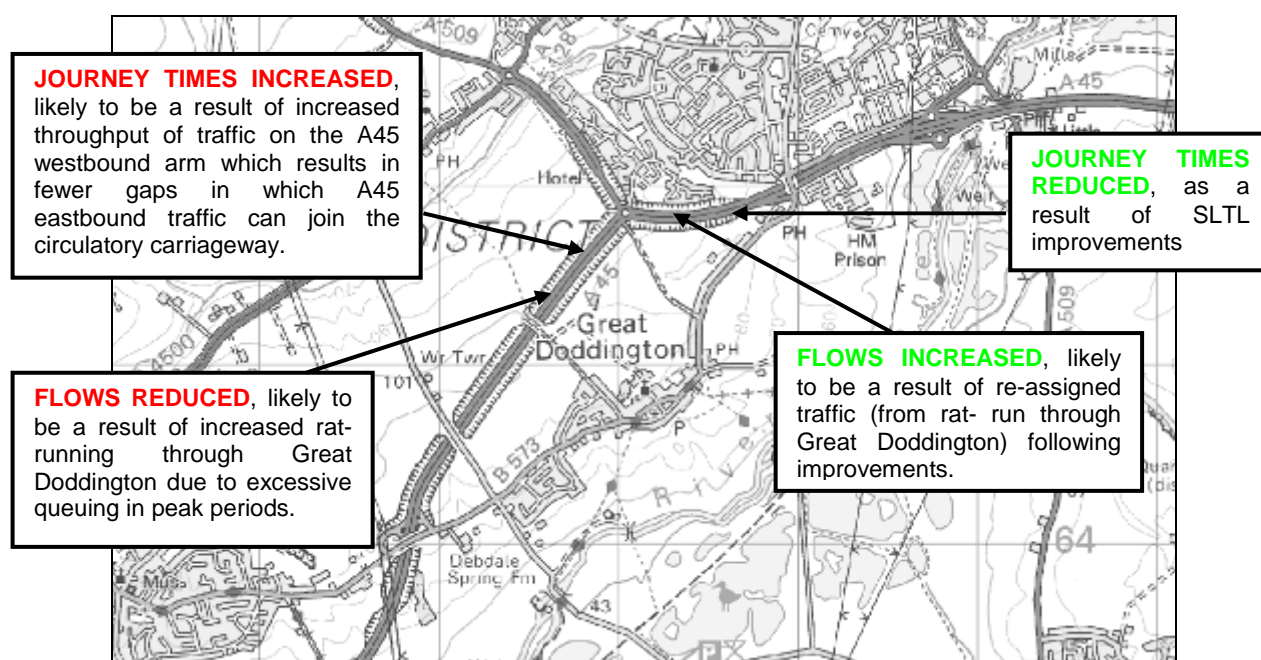
Table 4.4 - Observed Average 'Before' and 'After' Scheme Opening Journey Times

Roundabout Approach	Before		After		Difference	
	AM	PM	AM	PM	AM	PM
A45 Eastbound	01:40	04:58	03:11	04:23	-01:31	00:35
A45 Westbound	05:30	02:01	01:11	01:06	04:24	00:55
Bourton Way	00:52	00:43	01:01	00:48	-00:09	-00:05
A509 Wilby Way	02:37	03:00	01:02	01:59	00:38	01:01

Note: Journey times in mins/veh averaged over multiple runs. Negative values represent disbenefits

4.28 Key points to note from **Table 4.4** include:

- ◆ Journey times on the A45 eastbound have increased in the AM Peak but decreased in the PM peak;
- ◆ Journey times on the A45 westbound have decreased significantly in the AM Peak and to a lesser extent in the PM peak;
- ◆ Journey times on Bourton Way have stayed relatively constant; and
- ◆ Journey times on the A509 Wilby Way have decreased in the AM peak and to a greater extent in the PM peak.

Figure 4.3 – Summary of Outturn Impacts

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4.29 As detailed in Section 4.5, the increase in traffic on the A45 westbound arm is greater than 10%. This is likely to be a result of re-assigned traffic following the improvements. For the purposes of this evaluation the Rule of Half methodology has therefore been applied to the traffic on the A45 westbound arm only.

- 4.30 The Rule of Half makes an assumption that all traffic at the junction before scheme opening receives the full benefit of the scheme. The additional traffic attracted to the junction following the improvements is then assumed to receive half of the benefits of the scheme.
- 4.31 **Table 4.5** provides a summary of the predicted, predicted corrected and outturn monetised economic benefits of the scheme.

Table 4.5 - Comparison of Predicted and Outturn Economic Benefits

Scenario	Total Vehicle Hours Saved in Opening Year	VOT Saving in Opening Year	60 year VOT Benefits
PAR Predicted	249,493	£2.586m	£130.489m
PAR Predicted Corrected	249,493	£2.571m	£122.643m
Outturn	50,866	£0.524m	£25.004m

Note: All values are in 2002 prices discounted to 2002 at 3.5%

- 4.32 The results from this analysis show an outturn total number of vehicle hours saved in the opening year of 50,866 hours. This amounts to a value of time saved in the opening year of £0.524m (2002 prices), which translates to a scheme life saving (60 years) of £25.004m (2002 prices, discounted to 2002).
- 4.33 Applying the rule of half to one arm only is not standard practice in the POPE methodology. As such, for comparison, the 60 year VOT benefit without applying the rule of half to the A45 westbound arm has been calculated. Without applying the rule of half, the 60-year benefit is £3.255m higher at £28.259m (2002 prices, discounted to 2002). For the purposes of the Evaluation Summary Table (EST) the benefit with the rule of half applied has been reported.
- 4.34 Whether the rule of half is applied or not the outturn monetised economic benefits are considerably less than those predicted in the PAR. This is likely to be a result of an overestimate of benefits brought about by poor calibration of the ARCADY model used to derive the predicted benefits.

Summary – Section 4:

- ◆ Traffic has increased marginally on the junction as a whole but increased significantly on the A45 westbound arm where the greatest improvement to journey times has been achieved;
- ◆ Traffic volumes on the A45 eastbound approach have decreased. Anecdotal evidence suggests that traffic is using the B573 through the village of Great Doddington as a rat-run to avoid the queues;
- ◆ The outturn PVC was £1.664m compared to a PAR predicted corrected scheme PVC of £1.888m. The outturn scheme cost was therefore £0.224m lower than the predicted corrected cost of the scheme; and
- ◆ The outturn 60 year VOT benefits (£25.004m) are considerably less than those predicted (£122.643m).

5. Safety Impacts

INTRODUCTION

- 5.1 This section examines the accidents both 'before' and 'after' scheme opening to establish whether the scheme has resulted in a post opening safety benefit or disbenefit. The objectives of this section are:
- ◆ To ascertain whether the scheme has achieved the safety objectives set out in **Section 1**;
 - ◆ To determine whether there has been any change in the number, location and causation of Personal Injury Accidents (PIAs) following scheme opening; and
 - ◆ To determine if the scheme has resulted in an overall safety benefit or disbenefit.
- 5.2 The accident data referred to in this report has not necessarily been derived from the national validated accident statistics produced by DfT. As such, the data may subsequently be found to be incomplete or contain inaccuracies. The requirement for up-to-date information and site specific data was a consideration in the decision to use un-validated data and, as it is sourced from Local Processing Units through the HA's Managing Agency Contractors, it is sufficiently robust for use in this context.

PAR ANALYSIS AND ASSUMPTIONS

- 5.3 In the PAR assessment PIA data was collated between September 2001 and September 2005 (48 months) in the vicinity of the roundabout. The exact area for which PIA data was obtained was not specified.
- 5.4 Key features of the PAR include the following:
- ◆ The PAR demonstrated that 9 accidents occurred in the five year period, amounting to an observed accident rate of 1.8 PIA/yr. This compares to a national average of 4.9 PIA/yr for a junction of this type (as detailed in the COBA manual, DMRB 13.1.2);
 - ◆ The severity index² was 0% prior to scheme opening with no fatal or serious accidents reported;
 - ◆ An accident saving of 0.75 PIAs was predicted in the opening year; and
 - ◆ An accident saving of 44 over the 60 year design period was predicted.
- 5.5 The predicted opening year accident savings were derived from an assessment by the Road Safety Manager however no specific details were available for review.

² Fatal accidents plus Serious accidents as a percentage of all accidents

POST OPENING EVALUATION (POPE)

PAR Predicted Corrected Analysis

- 5.6 In order to produce a like-for-like comparison of predicted and outturn impacts, a PAR predicted corrected appraisal of the scheme has been undertaken. PIA data was provided by the MAC for the most recent five years 'before' scheme construction PIA (July 2002 to August 2007).
- 5.7 PIA data for the A509 Wilby Way arm was obtained from Northamptonshire County Council as this is not a HA road.
- 5.8 The PAR predicted corrected analysis allowed for an appropriate area for before and after opening accident analysis to be identified. This area extends to the maximum extent of the before scheme opening queues on each arm to account for shunt and congestion related accidents.
- 5.9 Traffic management during the period of construction would clearly have affected driver behaviour; therefore this assessment will only compare accidents from before the start of construction with those after full operation. Those accidents that occurred during the construction period have therefore been specifically excluded from this assessment.
- 5.10 In addition, accidents which were deemed to have occurred for reasons not attributable to the scheme (such as police pursuits, vehicle mechanical failure etc) were also specifically excluded from the analysis. In total 4 accidents were excluded on this basis.
- 5.11 During the predicted corrected period, 48 accidents were recorded in the study area, 43 slight, 4 serious and 1 fatal resulting in a severity index of 10% (**Table 5.1**). The observed accident rate was 9.6 PIA/year.
- 5.12 As an explanation for the predicted accident saving in the opening year was not specified in the PAR, for the purposes of the PAR predicted corrected analysis the same percentage saving applied in the PAR (42%) has been applied to the PAR predicted corrected accidents. This resulted in a predicted corrected accident saving amounting to 4 PIAs in the opening year (i.e. 42% of 9.6).

Outturn Impacts

- 5.13 The outturn assessment of the scheme's safety impacts is based on the following assumptions:
- ◆ The PIAs occurring in the construction period (August 2007 – December 2007) have been excluded from the analysis;
 - ◆ The post opening period has been assessed from January 2008 to December 2008 (12 months);
 - ◆ Accidents which were deemed to have occurred for reasons not attributable to the scheme (for example police pursuits, vehicle mechanical failure etc) were specifically excluded from the analysis. On this basis one post opening accident was excluded; and

- ◆ In order to provide a direct comparison between pre and post opening accident data on a like-for-like basis, the outturn safety impacts of the scheme have been evaluated using accidents within the same area as the PAR predicted corrected analysis.

5.14 It is standard practice for accident savings to be evaluated for at least three years after scheme opening in order to gain a fair reflection of the post opening accident trends. Consequently, the results presented in this report should be regarded as emerging trends and indicative only. The results of the outturn assessment of scheme impacts are summarised in **Table 5.1**.

Table 5.1 – Pre and Post Scheme Opening Accident Summary

Period	No. of Years	Accident No./Rate	Slight	Serious	Fatal	TOTAL	Severity Index
"Before" Scheme Opening	5	Accident No.	43	4	1	48	10%
		Accident Rate per year	8.6	0.8	0.2	9.6	
"After" Scheme Opening	1	Accident No.	4	0	0	4	0%
		Accident Rate per year	4	0	0	4	
Change in Accident Rate (per year)			4.6	0.8	0.2	5.6	10%

Note: "Before" scheme opening refers to PAR predicted corrected analysis

5.15 Key findings from the accident analysis include:

- ◆ There has been a reduction in the number of PIAs from a rate of 9.6 per year in the before period to 4 PIA/year in the after opening period. This amounts to a saving of 5.6 accidents per year; and
- ◆ The severity index has decreased from 10% to 0% as a result of no serious or fatal accidents in the post opening period.

ACCIDENT CAUSATION FACTORS

5.16 The PAR reported that accidents caused by conflict within the roundabout and rear end shunting in the queues were the most common type of accident prior to the scheme. Post opening, **Figure 5.2** illustrates there were no accidents on the circulatory carriageway however rear end shunts were still prevalent on the A45 eastbound where there have been no observed improvements in queuing.

ACCIDENT CLUSTERS

5.17 As shown in **Figures 5.1** and **5.2** a large proportion of the accidents occurred on the A45 eastbound and this continues in the post opening period. Before scheme

opening, 5.2 PIA/yr occurred on the A45 eastbound compared to 3 PIA/yr in the after opening scenario. On the A45 westbound the accident rate has reduced from 2.8 PIA/yr to 1 PIA/yr whilst the severity index has dropped from 21% to 0%.

Figure 5.1 – Before Opening Accident Locations (2002 – 2007)

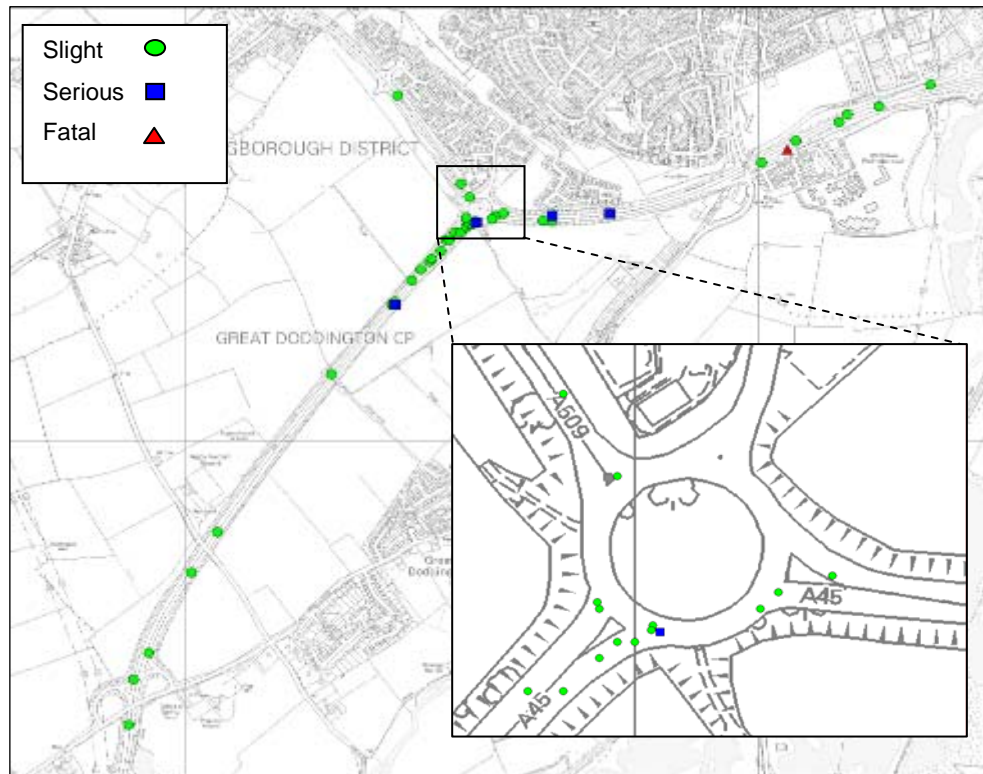
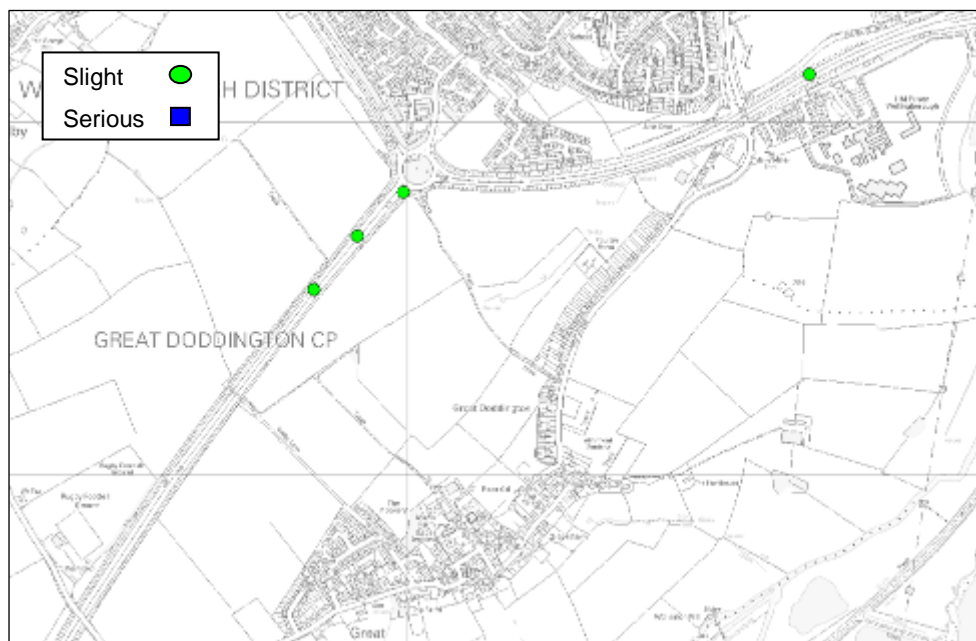


Figure 5.2 - After Opening Accident Locations (2008)



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MONETISATION OF ACCIDENT SAVINGS

- 5.18 The outturn accident saving of 5.6 PIA/yr³ amounts to a benefit of £0.503m (2002 prices discounted to 2002 at 3.5%) in the opening year. **Table 5.2** below presents the 60 year accident cost benefits attributed to the scheme:

Table 5.2 – Comparison of PAR, PAR Predicted Corrected and Outturn Accident Analysis

	PAR Predicted	PAR Predicted-Corrected	Outturn
Number of PIAs saved in opening year	0.75	4	5.6
Number of PIAs saved in 60 year assessment period	44	237	331
Accident Severity Index	0%	10%	0%
Average cost of accident in the opening year	89,850	89,850	89,850
Annual accident benefit in opening year discounted 2002	£0.057m	£0.359m	£0.503m
Accident benefits over 60 year assessment period, discounted to 2002	£2.901m	£15.478m	£21.669m

- 5.19 A Chi-squared test has been undertaken to determine whether the outturn savings between the PAR Predicted Corrected and Outturn analysis occurred by chance or is a direct impact of the scheme. From this test **we can be 95% confident that the change in accident rate could have occurred by chance alone and therefore the change in accident rates is not necessarily a direct impact of the scheme.**

Summary – Section 5:

- ◆ There is an after scheme opening PIA rate of 4 PIA/year compared to an average of 9.6 per year in the before period. This is an accident saving of 5.6 PIA/year;
- ◆ The severity index has increased from 10% to 0%;
- ◆ There have been no fatalities at the junction or its approaches since scheme opening;
- ◆ A chi squared test has demonstrated that we can be 95% confident that the change in accident rate could have occurred by chance alone and therefore the change in accident rates is not necessarily a direct impact of the scheme;
- ◆ The outturn annual accident benefit in the opening year is £0.503m, which is significantly higher than the PAR predicted (£0.057m) and PAR predicted corrected saving of £0.359m.

³ 9.6 average PIAs per year 'before' – 4 average PIAs per year 'after'

6. Environmental, Accessibility and Integration Impacts

INTRODUCTION

- 6.1 The PAR stated that with the exception of a slight beneficial impact on journey ambience all other impacts on the environment criteria would be neutral. The PAR predicted a slight adverse impact on severance with a beneficial impact on land use policy and other government policies.
- 6.2 This chapter assesses the outturn impacts of the scheme on the built and natural environment. This includes the direct and indirect environmental effects of the transport improvements. The environment impacts of concern include noise, atmospheric pollution of differing kinds, and impacts on the countryside and wildlife, ancient monuments and historic buildings, physical fitness and journey ambience.
- 6.3 The forecast impacts of the scheme have been derived from the PAR document. The main source of information for the outturn assessment was a site visit that was undertaken by Atkins in February 2009.

IMPACTS ON THE ENVIRONMENT

- 6.4 The scheme was predicted to have slight beneficial impact on journey ambience, with no impact on the other environment sub-objectives. **Table 6.1** summarises the predicted and outturn environmental impacts of the scheme.

Table 6.1 – Summary of Predicted and Outturn Environmental Impacts

Sub-Objective	PAR/AST	EST
Noise	<ul style="list-style-type: none"> Noise annoyance is defined as 'a feeling of displeasure evoked by noise'⁴. Relatively large changes in traffic flows and speeds are required to bring about significant changes to noise levels in the longer term. 	<ul style="list-style-type: none"> Total average weekday traffic (7am – 7pm) has increased by approximately 6% between 2002 and 2008 No impact = change in traffic flow less than 25%, change in HGV less than 20% and change in speed is less than 5mph
	No impact	No impact
Local Air Quality	<ul style="list-style-type: none"> Existing condition modelling to determine the likely scale of improvement of predicted flows was not undertaken. 	<ul style="list-style-type: none"> Reduced congestion is likely to have improved air quality on the A45 westbound approach Options which change traffic flows by less than 10% can usually be assessed as having no impact
	No impact	No impact

⁴ Transport Analysis Guidance – unit 3.3.2

Greenhouse Gases	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> If the change in total distance travelled on roads affected by the project is less than 10%, the scheme can be regarded as having no impact.
	No impact	No impact
Landscape	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> The scheme has included the planting of trees to ensure that the scheme will blend in well with surrounding landscape features.
	No impact	No impact
Townscape	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> Impacts apply to projects in built up areas or where a project reduces traffic flows in a built up area.
	No impact	No impact
Heritage of Historic Resources	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> No evidence of impact on archaeological or noteworthy built heritage sites.
	No impact	No impact
Biodiversity	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> There are no protected species or breeding birds and there is no habitat of local or greater value existing prior to the scheme.
	No impact	No impact
Water Environment	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> No change to the highway drainage or to the means of discharge.
	No impact	No impact
Physical Fitness	<ul style="list-style-type: none"> No impact was predicted 	<ul style="list-style-type: none"> Scheme replaced an existing crossing and it is not anticipated that pedestrian movement will increase.
	No impact	No impact
Journey Ambience	<ul style="list-style-type: none"> Removal of a high proportion of traffic from the roundabout via free-flow segregated lane was predicted to reduce driver frustration. 	<ul style="list-style-type: none"> Accident number has decreased; therefore the fear of potential accidents has been reduced. Improved journey times are likely to have reduced driver's level of frustration.
	Slight beneficial impact	Slight beneficial impact

ACCESSIBILITY IMPACTS

- 6.5 The scheme was predicted to have slight adverse impact on severance, with no impact on the other accessibility sub-objectives. **Table 6.2** summarises the predicted and outturn accessibility impacts of the scheme.

Table 6.2 - Summary of Predicted and Outturn Accessibility Impacts

Sub-Objective	PAR/AST	EST
Option Values	<ul style="list-style-type: none"> No impact was predicted 	<ul style="list-style-type: none"> There has been no change in the availability of transport services within the study area.
	No impact	No impact
Severance	<ul style="list-style-type: none"> The public right of way would have to be diverted to cross the A45 northern arm some 350m to the west of the roundabout if a departure from standard was not granted. 	<ul style="list-style-type: none"> The departure from standard was granted, and there has been no change to the routes used by pedestrians, equestrians or cyclists.
	Slight adverse	No impact
Access to the Transport System	<ul style="list-style-type: none"> No impact was predicted. 	<ul style="list-style-type: none"> The scheme had no impact on access to a private car or proximity to a public transport service.
	No impact	No impact

INTEGRATION

- 6.6 Integration is aimed at ensuring that all decisions are taken in the context of the Government's integrated transport policy.
- 6.7 The scheme was predicted to have a beneficial impact on land-use policy and other government policies, with no impact on the other integration sub-objectives. **Table 6.3** summarises the predicted and outturn integration impacts of the scheme.

Table 6.3 – Summary of Predicted and Outturn Integration Impacts

Sub-Objective	PAR/AST	EST
Transport Interchange	<ul style="list-style-type: none"> No impact was predicted 	<ul style="list-style-type: none"> The scheme does not affect access to park and ride, bus or rail stations and does not affect interchange facilities.
	No impact	No impact
Land-Use Policy	<ul style="list-style-type: none"> The Government's land-use 	<ul style="list-style-type: none"> At a local level, the Victoria

Sub-Objective	PAR/AST	EST
	policy would be enhanced by the relief of traffic congestion provided by the SLTL.	Business Park and other proposed developments around Wellingborough would benefit from the improved junction whilst at a regional level the improvements fit in with the objectives of the Growth Agenda for South Midlands.
	Beneficial	Beneficial
Other Government Policies	<ul style="list-style-type: none"> The Office of the Deputy Prime Minister (ODPM) policy for growth in the south east will be enhanced by the provision of a SLTL at this junction as this would reduce congestion affecting traffic generated by new developments. 	<ul style="list-style-type: none"> The Community Infrastructure Fund (CIF) is a £200m fund jointly administered by the Department for Transport and the ODPM. CIF funding was made available to transport projects supporting housing growth in the four designated Growth Areas. Wilby Way roundabout is one such project
	Beneficial	Beneficial

Summary – Section 6:

- Summary of PAR predicted and outturn environment, accessibility and integration impacts:

	PAR Predicted	Outturn
Noise	No Impact	No Impact
Local Air Quality	No Impact	No Impact
Landscape	No Impact	No Impact
Greenhouse Gases	No Impact	No Impact
Townscape	No Impact	No Impact
Heritage of Historic Resources	No Impact	No Impact
Biodiversity	No Impact	No Impact
Water Environment	No Impact	No Impact
Physical Fitness	No Impact	No Impact
Journey Ambience	Slight Beneficial	Slight Beneficial
Option Values	No Impact	No Impact
Severance	Slight Adverse	No Impact
Access to the Transport System	No Impact	No Impact
Transport Interchange	No Impact	No Impact
Land Use Policy	Beneficial	Beneficial
Other Government Policies	Beneficial	Beneficial

7. Summary and Conclusions

INTRODUCTION

7.1 The POPE assessment of the A45 Wilby Way Scheme has utilised the data available to examine the outturn impacts of the scheme compared to those forecast in the PAR. The purpose of this section is to:

- ◆ Draw together the key impacts emerging from the POPE evaluation;
- ◆ Summarise the main conclusions from the evaluation; and
- ◆ Suggest recommendations that will facilitate and increase the accuracy of future PAR appraisals for schemes similar to that implemented at the Wilby Way roundabout.

SUMMARY OF KEY IMPACTS

7.2 **Table 7.1** provides a summary of the monetised benefits of the scheme. The Appraisal Summary Table (AST) and Evaluation Summary Table (EST) are included in **Appendices A** and **B** respectively.

7.3 All scheme benefits (predicted and outturn) are derived from a combination of both safety and transport economic efficiency benefits, attributed to a reduction in accidents and a reduction in journey times/delay.

Table 7.1 – Summary of Scheme Benefits (Predicted, Predicted Corrected and Outturn)

	Predicted	Predicted Corrected	Outturn
First Year Benefits	£2.64m	£2.93m	£1.027m
60 Year Benefits	£133.4m	£138.1m	£46.7m
First Year Costs	£1.599m	£1.816m	£1.604m
Total 60 Year Costs*	£1.673m	£1.888m	£1.664m
Benefit Cost Ratio (BCR)	79.7	73.1	28.1
First Year Rate of Return (FYRR)	165%	161%	64%

Note: All costs are in 2002 prices and discounted to 2002

* Includes 60 year maintenance cost

7.4 Key points to note from the above include:

- ◆ The total first year benefits of the scheme were £1.027m, equating to a 60 year benefit of £46.7m, this is considerably less than predicted;
- ◆ The scheme was delivered at a PVC of £1.664m compared to a prediction of £1.673m; and

- ◆ The outturn BCR was 28.1 and the outturn FYRR of 64%, these are also considerably less than expected, however this still constitutes this scheme is highly advantageous in economic terms.

7.5 The main economy, safety, environment, accessibility and integration impacts of the scheme are listed below:

ECONOMY

- ◆ The outturn first year economic benefits of the scheme were £1.027m of which £0.524m were attributed to VOT benefits with £0.503m attributed to safety benefits;
- ◆ The outturn FYRR and BCR was 64% and 28.1 respectively, demonstrating good value for money, although lower than forecast;
- ◆ Total traffic in the AM and PM peak periods at the junction (from all arms) has increased by 5% and 2% respectively between 2005 and 2008. This is broadly in line with NRTF estimates for the same period (4.8%);
- ◆ Traffic on the A45 (S) arm has reduced by 14% in the AM peak and 9% in the PM Peak;
- ◆ Traffic on the A45 (E) arm has increased by 38% in the AM peak and 12% in the PM peak; and
- ◆ There has been an observed reduction in journey times on the A45 westbound.

SAFETY

- ◆ There has been a reduction in the number of accidents equivalent to 5.6 PIAs per year since the scheme opened. This is greater than predicted saving of 0.75 PIAs per year;
- ◆ A Chi squared test has revealed that the change in accident rate and severity could have occurred by chance alone and therefore the observed accident saving is not necessarily attributable to the scheme;
- ◆ The severity index has reduced from 10% to 0%; and
- ◆ Analysis of accident data has shown that accidents have been removed from the roundabout circulatory carriageway and almost completely on the A45 westbound.

ENVIRONMENT

- ◆ The impact of the scheme on journey ambience is considered to be **slight beneficial** as there has been a reduction in the number of accidents and an improvement in roadside facilities, signing and reduced journey times; and
- ◆ It was considered that there was no impact on all other environmental evaluation categories.

ACCESSIBILITY

- ◆ The scheme had no measurable impacts on severance, cycling/walking accessibility or access to the transport system and as such the impact of the scheme on accessibility can be considered to be **no impact**.

INTEGRATION

- ◆ The objectives of the scheme fit in with the objectives of the Growth Agenda for South Midlands and support housing growth policies. The impact of the scheme on integration can be considered to be **beneficial**.

CONCLUSIONS

- 7.6 In summary, this report has demonstrated that the scheme has delivered considerable safety and journey time benefits particularly on the A45 westbound.
- 7.7 As is the case for many Large LNMS schemes, the accident analysis has been based on a single year of post opening data and as such the accident benefits calculated in this report should therefore only be used to provide the HA and other readers with an indication of the overall scheme benefits.

RECOMMENDATIONS

- ◆ Only accidents of relevance to the scheme should be included in PAR appraisals to avoid an overestimate of savings that can be attributed to a scheme;
- ◆ Accidents should be considered to the maximum extent of the before opening queues, particularly in schemes with a high proportion of shunt type congestion related accidents;
- ◆ Consideration should be given to the impact of re-assigned traffic on scheme appraisal. This should include the impact on those routes where rat-running may be reduced;
- ◆ Whilst pre-opening journey time surveys were undertaken, in this case these were not used to calibrate the ARCADY modelling. Where feasible, the PAR should utilise observed journey time/delay data to verify outputs from ARCADY, as this provides more suitable calibration than calibration by queue length. Where queue lengths are used for calibration it should be ensured that models are calibrated to match the observed queues.

APPENDIX A – Appraisal Summary Table (AST)

Appraisal Summary Table (AST)		A45/A509 Wilby Way	
Objective	Sub-Objective	Qualitative Impacts	Quantitative Measures
ENVIRONMENT	Noise	Not Applicable	N/A
	Local Air Quality	Not Applicable	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
	Journey Ambience	By removing a high proportion of traffic from the circulatory carriageway of the roundabout via the free-flow segregated traffic lane, the frustration of varying queues and standing traffic in peak periods reduces frustration and the fear of potential accidents	N/A
SAFETY	Accidents	The scheme provides a significant accident saving benefit. Accident impact during construction has not been calculated.	44 accidents saved
	Security	Not Applicable	
ECONOMY	Public Accounts	None	Fully Government funded improvement scheme
	Business Users and Providers	Not Applicable	N/A
	Consumer Users	Not Applicable	N/A
	Reliability	Reliability will be significantly improved by consistently reducing delays and the varying queuing times at the junction during peak periods.	There is no change in stress level on the links adjacent to the roundabout. However, on the immediate A45 East approach a substantial volume of traffic is diverted from the roundabout via the segregated lane. Thus reliability will benefit as queuing, particularly on the A45, is substantially reduced.
	Wider Economic Impacts	Not Applicable	N/A

LNMS Evaluation Report

A45/A509 Wilby Way Junction Segregated Left Turn Lane (SLTL)

ACCESSIBILITY	Option Values	Not Applicable	N/A	N/A
	Severance	If a departure from standards is not granted the public right of way has to be diverted to cross the A45 northern arm some 350 metres to the west of the roundabout, providing further adverse distance conditions, but with better inter-visibility.	A pedestrian survey over the 2004 August bank holiday weekend and on a school term weekday observed only 3 hikers, as a group, used the public right of way to cross the A45 - from south to north. It is not anticipated that pedestrian movements will increase significantly when the new housing and industrial developments are in place.	Slight Adverse
INTEGRATION	Access to Transport System	Not Applicable	N/A	N/A
	Transport Interchange	Not Applicable	N/A	N/A
	Land Use Policy	The Government's Land-use Policy will be enhanced by the relief of traffic congestion provided by the SLTL.	N/A	Beneficial
	Other Government Policies	The ODPM's policy for growth in the south east will be enhanced by the provision of a SLTL at this junction as this will reduce congestions affecting traffic generated by the developments.	N/A	Beneficial

APPENDIX B – Evaluation Summary Table (EST)

Evaluation Summary Table (EST)		A45/A509 Wilby Way		
Objective	Sub-Objective	Qualitative Impacts	Quantitative Measures	
ENVIRONMENT	Noise	Not Applicable	N/A	
	Local Air Quality	Not Applicable	N/A	
	Greenhouse Gases	Not Applicable	N/A	
	Landscapes	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	
	Journey Ambience	There has been a reduction in the number of accidents and an improvement in pedestrian crossings, signing and reduced journey times	N/A	Slight Beneficial
SAFETY	Accidents	The scheme provides an accident saving benefit. Accident impact during construction has not been calculated.	331 Accidents saved over 60 years	
	Security	Not Applicable	N/A	
ECONOMY	Public Accounts	Fully Government funded improvement scheme	N/A	
	Business Users and Providers	Not Applicable	N/A	
	Consumer Users	Not Applicable	N/A	
	Reliability	Reliability has been significantly improved by a reduction in delays and the varying queuing times particularly on the A45 westbound during peak periods. In contrast there has been an adverse impact on delay on the A45 eastbound.	50,866 vehicle hours saved in opening year	60 year Value of Time Benefits of £25.004m
	Wider Economic Impacts	Not Applicable	N/A	No Impact
ACCESSIBILITY	Option Values	Not Applicable	N/A	No Impact
	Severance	Public right of way maintained	N/A	No Impact
	Access to Trans System	Not Applicable	N/A	No Impact
INTEGRATION	Transport Interchange	Not Applicable	N/A	No Impact
	Land Use Policy	The objectives of the scheme fit in with the objectives of the Growth Agenda for South Midlands	N/A	Beneficial
	Other Government Policies	CIF funding was made available for this scheme as it is a transport project supporting housing growth in an identified designated Growth Area	N/A	Beneficial

APPENDIX C – Glossary

The following table details the acronyms and specialist terms used within the context of this report.

Term	Definition
AADT	Annual Average Daily Traffic. Average of 24 hour flows, seven days a week, for all days within the year.
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.
ARCADY	Assessment of Roundabout Capacity and Delay software that is used for predicting capacities, queue lengths, delays (both queuing and geometric) and accident risk at roundabouts.
AST	Appraisal Summary Table. This records the impacts of the scheme according to the Government’s five key objectives for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG
BCR	Benefit Cost Ratio is a ratio identifying the relationship between cost and benefits of a proposed project.
CIF	Community Infrastructure Fund is a £200m fund jointly administered by the Department for Transport and the ODPM. CIF funding was made available to transport projects supporting housing growth in four designated Growth Areas.
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods. It 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 is used. For the purpose of this appraisal a base year of 2002 has been used.
EST	Evaluation Summary Table. In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST.
FYRR	First Year Rate of Return is the ratio of money gained on an investment relative to the amount of money invested.
GIS	Geographical Information Systems capture, store, analyze, manage, and present data that is linked to location.
GPS	Global Positional System allows the exact location of a receiver to be identified and recorded
HGV	Heavy Goods Vehicle is the term for a goods vehicles (i.e. lorries) with a maximum allowed mass over 3.5 tonnes
HA	Highways Agency. An Executive Agency of the Department for Transport, responsible for operating, maintaining and improving the strategic road network in England.
JUICE	Junction User Interface Cost Evaluation is a tool used in highway economic

	appraisal for individual junction evaluation and appraisal.
LNMS	Local Network Management Scheme A contribution to bringing about the changes required by the integrated transport white paper and 10 year plan.
MAC	A Managing Agent Contractor is responsible for the operation, maintenance, and improvement of the motorway and trunk road network of a Highways Agency area.
NRTF	National Road Traffic Forecast. This document defines the latest forecasts produced by the Department of the Environment, Transport and the Regions of the growth in the volume of motor traffic. The most recent one is NRTF97 and the one previous was NRTF89.
ODPM	The Office of the Deputy Prime Minister is the United Kingdom government department for communities and local government, now known as The Department for Communities and Local Government (DCLG)
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.
PAR	Project Appraisal Report is a mandatory requirement for all Highways Agency construction projects, except for projects in the Programme of Major Schemes and purely maintenance projects. The PAR document summarises the need for a project, its costs and benefits, including those that cannot be monetised. It is an aid to the decision-maker in judging the worth and priority of a project.
PIA	Personal Injury Accident. A road traffic accident in which at least one person required medical treatment.
POPE	Post Opening Project Evaluation , before & after monitoring of all major highway schemes in England.
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, or a stream of costs associated with a project or proposal.
Risk Allowance	Risk refers to identifiable future situations that could result in an overspend or underspend occurring. The base cost estimate is adjusted to account for risk in order to obtain more accurate cost estimates.
RPI	The Retail Price Index is an important domestic indicator of inflation in the United Kingdom. It measures the average change from month to month in the prices of goods and services.
Rule of Half	The rule of half applies where there has been a 10% or greater increase in traffic flow post scheme opening. In this case the re-assigned traffic receives half the benefit of the scheme improvements.
Severance	Community severance is the separation of adjacent areas by road or heavy traffic, causing negative impact on non-motorised users, particularly pedestrians.
SLTL	Segregated Left Turn Lane is a left turn lane from a roundabout entry to the first exit, separated from the roundabout entry, circulatory carriageway and exit by means of a kerbed island and associated road markings

TEMPRO	The Trip End Model Presentation Program has been designed for fast and efficient access to the national Trip End Model projections of growth in travel demand, and the underlying car ownership and planning data projections.
TRADS	TRADS is a traffic information database system that provides access to traffic flow information collected from England's motorway and major trunk road network.
Vehicle Hours	Vehicle hours refers to the total time spent by all vehicles using a road and is expressed normally as an annual value. For example, if 10,000 vehicles a day received a 6 minute journey time benefit, the vehicle hours for the day would be 1,000 i.e. $(10,000 \times 6)/60$. For the year this would equate to 365,000 (assuming the savings occurred over 365 days per year).
VOT	Value of Time in transport economics is the opportunity cost of the time that a traveler spends on his/her journey. Using a set of values of time, the economic benefits of a transport project can be quantified in order to compare them to the costs (thus forming the basis of cost-benefit analysis)