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POPE of LNMS

A52 West of Nottingham Corridor Improvements Evaluation Report

January 2016

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Document history

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Glossary

Term	a.k.a.	Definition
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 24 hour 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**
Asset Support Contractor	**ASC**	Responsible for the operation, maintenance, and improvement of the motorway and trunk road network of a Highways England area. First appointed in 2012, these replace **MAC**s
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 24 hour total traffic flow on an average day over a certain time period (Monday – Sunday)
Average Weekday Traffic	**AWT**	The 24 hour 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
Capitalisation	**-**	The process by which benefits for a scheme are factored to give an estimate for the appropriate appraisal period
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
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 England	**-**	An Government-owned company**,** 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 **PIC**s
Local Network Management Scheme	**LNMS**	LNMS are improvement schemes where 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, Severance, Environment, Non-Appraisable and Non-NATA
Managing Agent Contractor	**MAC**	Responsible for the operation, maintenance, and improvement of the motorway and trunk road network of a Highways England area. These are being replaced by **ASC**s, the first of which was appointed in 2012
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 Collison	**PIC**	A term commonly used to refer to road accidents
Post-Opening Project Evaluation	**POPE**	Before and after monitoring of all highway schemes in England
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 Highways England, to hold data from traffic monitoring sites on the strategic network
Web-based Transport Analysis Guidance	**WebTAG**	The Department for Transport's transport appraisal guidance and toolkit, first issued in 2003

1. Introduction

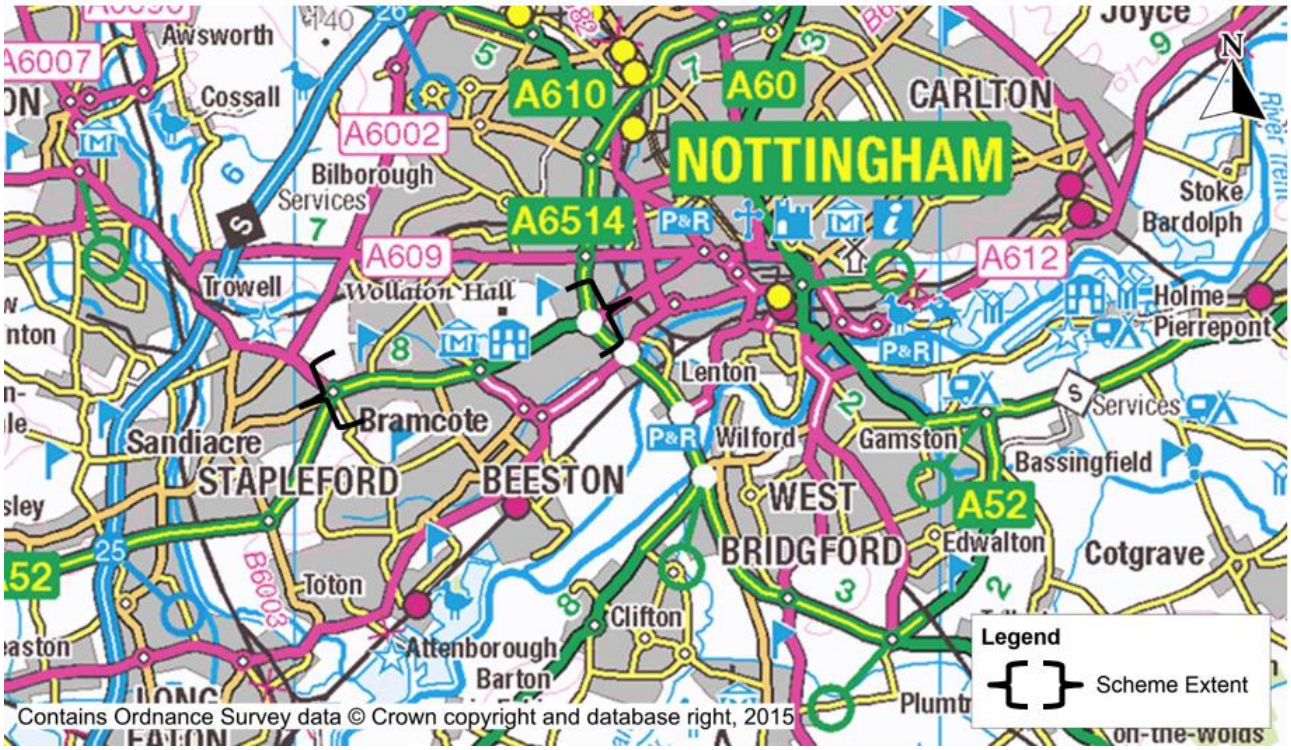
Background

1.1. This report is the Post-Opening Project Evaluation (POPE) of the **A52 West of Nottingham Corridor Improvements** Local Network Management Scheme (LNMS), produced by Atkins on behalf of Highways England.

1.2. The A52 corridor connects the M1 Junction 25 with Nottingham City Centre. The section under consideration is between Bramcote and the Queens Medical Centre (QMC) which forms part of the University of Nottingham to the West of Nottingham city centre.

1.3. The location of the A52 West of Nottingham corridor considered as part of this LNMS is indicated in **Figure 1.1**.

Figure 1.1 – Location Plan



1.4. The A52 corridor between the M1 and Nottingham City Centre has been a congestion hotspot for a number of years. The link forms part of a national, Derby to Grantham Public Service Agreement (PSA) link, highlighted as one of the worst delayed links in the country. Previous attempts to improve the reliability and journey times within the corridor have included an improvement scheme at Bardills Roundabout in 2007 and subsequent studies to address congestion at the QMC Roundabout.

1.5. The A52 West of Nottingham Corridor LNMS is a corridor-wide package of upgrades which includes the full signalisation of the QMC and Priory Roundabouts and other upgrades to traffic signals equipment with MOVA installed at the junctions formed with Thoresby Road and Wollaton Road. Supporting works include some local highway widening to accommodate the new junction layouts, new pedestrian facilities, remarking of road markings to improve

vehicle merge arrangements and a new section of bus lane close to and on the QMC Roundabout.

1.6. This scheme attempted to holistically consider the issues experienced along the A52 corridor and deliver a package of improvements in their entirety. The range of measures introduced was expected to reduce traffic congestion, reduce vehicle journey time delays, improve reliability and in return, positively contribute towards the PSA target.

1.7. Whilst Atkins has not had confirmation on a construction start date, traffic data suggests that the construction of this scheme began during June 2011. The scheme opened on 25th May 2012.

1.8. In reading this report, consideration must be made to a number of parallel schemes which have likely impacted on the outturn results of this assessment. The details are as follows:

- A453 Widening (M1 Junction 24 to A52 Nottingham) – construction started on this scheme in January 2013 and was completed in August 2015. Between these dates, diversionary routes were set up to spread traffic, one of which was utilising the A52 and the corridor assessed in this report.

- Nottingham Tram works – extending the tram to Toton Lane (south of the A52 at the B6003 Bardills junction) and to Mill Hill (near the A453 just south of Clifton). Works started in early 2012 and were substantially complete by May 2015. The tram came into service on 25th August 2015. The tram works caused a number of impacts due to a number of long term road closures during this time that had a significant effect on traffic patterns:

    - The greatest impact of the A52 scheme was during very extensive construction works on the A6005. This included junction works at A6005 Queens Road West/Meadow Lane and then along University Boulevard – an important parallel route to the A52 corridor under consideration. This work took place from early 2012 and ended in May 2015.

    - Works on Abbey Street, the extension of the A6005 east of the A52 Dunkirk Roundabout caused disruption with a long period of shuttle working. It is suspected this deterred drivers from using the A6005 corridor.

    - Closure of Chilwell Road B6464 to through traffic – this is a well-used commuter route parallel to the A52, and was closed for 2 years from December 2012 to December 2014, but was subject to disruption until May 2015.

    - Bramcote Lane, which links A52 at Sherwin Arms to A6005 was closed for at least 6 months and had shuttle-working lights for longer (until about May 2015).

    - Toton Lane, linking the A52 at Bardills Roundabout to A6005 was affected by works at Bardills and the new P&R access.

- There were closures of other minor links that also disrupted local traffic. These tended to focus traffic going to Beeston from the north into using B6006 Wollaton Road which consequently became very congested.

1.9. This post-opening evaluation aims to assess the impact of the A52 West of Nottingham Corridor Improvements LNMS. However, it is acknowledged that traffic conditions during the period that construction works for the LNMS, and into the subsequent post-opening period, may be potentially impacted by traffic re-routeing due to disruption caused by the delivery of other, nearby transport schemes.

1.10. Analysis of long-term count data has demonstrated relatively consistent traffic levels prior to and following the opening of the scheme (see **Figure 3.1**, Chapter 3). Furthermore, given the city centre nature of the scheme location, it is considered that it may be difficult to isolate any specific period when there are absolutely no external factors influencing the highway conditions and so it was considered reasonable to progress the POPE on the basis of the available data and across a post-opening date range which ends prior to works starting on the A453. There is still considerable overlap with works on the Nottingham Tram and the findings of this report should be considered in this context.

Purpose of this report

1.11. As part of an ongoing programme, whereby Highways England (formerly Highways Agency) evaluates the impacts of trunk road schemes, Atkins is commissioned to undertake post-opening evaluations of LNMS with an implementation cost up to £10m.

1.12. This report sets out the results of the POPE of the A52 West of Nottingham Corridor LNMS. More specifically, this report examines the economic and safety impacts resulting from the improvements, with consideration also given to the wider impacts on the environment and society.

1.13. 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 4th quarter of each year outlining the key messages from the entire POPE of LNMS process.

2. Scheme Detail

Introduction

2.1. This section of the report outlines the pre-scheme and post-scheme layouts of the corridor, using photos, diagrams and site observations to illustrate the changes made to the highway network. In addition, this section contains the views and feedback on the scheme from key stakeholders.

Background

2.2. The A52 West of Nottingham Corridor LNMS introduces a range of improvements along the corridor between Bramcote and the Queen's Medical Centre (QMC) Roundabout to the west of Nottingham city centre; intending to improve journey times and reliability for users of this link. These are primarily at four key junctions along the link length. **Table 2.1** summarises the scheme details.

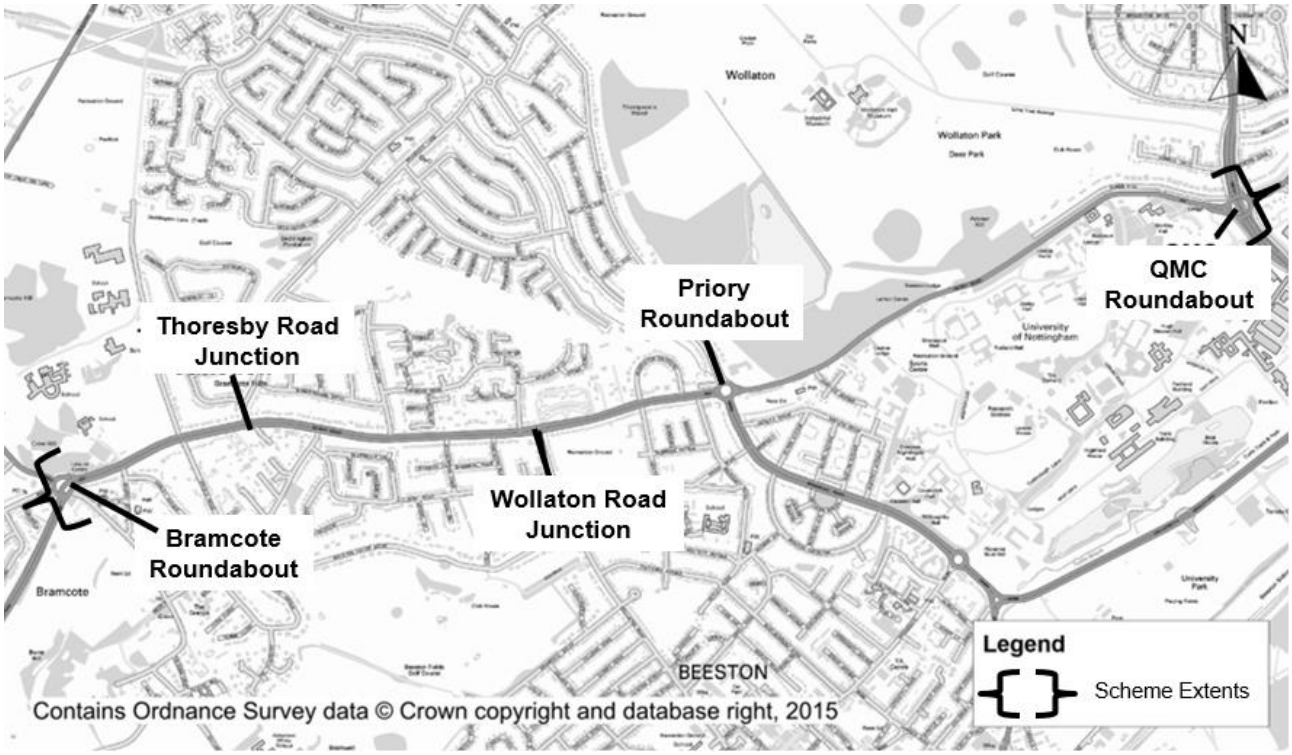
Table 2.1 – Summary of A52 West of Nottingham Corridor LNMS

Scheme name	A52 West of Nottingham Corridor
Area	7
Opening date	25th May 2012
Category	Economy
Reason for scheme	The scheme was developed to address issues with delays and congestion on the A52 between Bramcote and the QMC Roundabout during peak periods
Objectives	To reduce traffic congestion, reduce vehicle journey time delays and improve reliability along this link
Alternative options	5 alternative options (1, 1a, 1b1, 1b2 and Option 3 "no widening") have been considered for this link. The full details of these options are not listed in the PAR. The scheme chosen represents Option 3 "with widening"

Location

2.3. The scheme is located to the west of Nottingham city centre, and to the east of the M1 along a section of the A52, **as shown in Figure 1.1** and comprises upgrades to the four junctions shown on **Figure 2.1**.

Figure 2.1 – Junction Location Context Plan



A52 Corridor Layout

2.4. The A52 link comprises 3 lanes in each direction between the Bramcote Roundabout at the western end, and the Priory Roundabout which is in the central section of the scheme corridor. There is a bus lane on the nearside lane throughout this section on the eastbound carriageway which operates 24 hours a day, 7 days a week. There is a central reservation which restricts right turning movements, except at the junctions formed with Thoresby Road and Wollaton Road (both marked in **Figure 2.1**). All other junctions within the section operate as left in left out (LILO) junctions.

2.5. Between the Priory Roundabout and the QMC Roundabout to the east, the A52 is marked within one lane in each direction, with flares out to two lanes to and from the QMC Roundabout; and two/three lane flares from/into the Priory Roundabout respectively. There is no bus priority in this section.

2.6. The scheme corridor comprises a number of junctions as shown on **Figure 2.1**, some of which have been modified as part of this scheme. The full list of junctions travelling on the A52 corridor (from west to east) are set out below. The major junctions are highlighted in bold:

- At the western end of the scheme is the Bramcote roundabout. This is a 5 arm ‘hamburger’ style signalised gyratory formed by the A52 which approaches from the east and west. The junction provides interchange with the A6007 Ilkeston Road, Town Street and the B5010 Nottingham Road. The eastbound A52 carriageway dissects the circulatory, providing a more direct through-route for eastbound traffic.
- Between Bramcote roundabout and Thoresby Road junction are a number of side roads and accesses which all operate as LILO due to the central

reservation. Moor Lane joins to the north, as well as a direct access to Bramcote Leisure Centre and Bramcote School. To the south of the A52, there are four side road junctions; Church Street, Birdle Way, Derby Road and Elwin Drive. There is a staggered pedestrian crossing to the west of the Moor Lane junction.

- **The first major junction is with Thoresby Road. This is a signalised three-arm junction with a space in the central reservation meaning all turning movements are facilitated. The junction has no pedestrian facilities before the scheme.**
- Between Thoresby Road and Wollaton Road, there are 2 side road junctions to the north (Sandy Lane and David Grove) and 3 to the south (Cow Lane, Windermere Road and Coniston Road). These all operate as LILO due to the central reservation. There are two staggered pedestrian crossing near to the junction with Sandy Lane and Windermere Road.
- **The next major junction is where the B6006 Wollaton Road meets the A52 from the south. This is a signalised junction with a break in the central reservation to facilitate all possible turning movements. There were pedestrian facilities provided across the Wollaton Road arm and across the A52 to the west of the junction.**
- Between Wollaton Road and Priory Roundabout, there is 1 side road junction to the north (Middleton Crescent) and 2 to the south (Central Avenue and Boundary Road). There are also a number of direct accesses to residential properties on both sides of the road throughout this section. These all operate as LILO due to the central reservation. There is a staggered pedestrian crossing near to the junction with Central Avenue.
- **Priory Roundabout is a four arm gyratory formed by the A52 to the west and east, Wollaton Vale to the north and the A6464 Woodside Road to the south. There are 2/3 lanes on the circulatory carriageway of the roundabout which two ahead lanes marked on both A52 approaches. There was a staggered pedestrian crossing on the western arm.**
- To the east of Priory Roundabout, the A52 narrows to a single lane in each direction and no bus priority. Charles Avenue forms a side road from the south and there is also access to/from the University of Nottingham campus and Lenton Abbey. To the north there is a side road junction with Adams Hill. All junctions in this section allow for right turns in and out. Ghost islands are provided in some locations to assist turns off the A52. There are three signalised pedestrian crossings within the section - to the west of Charles Avenue junction; directly north of Sherwood Hall; directly north of Lenton and Wortley Hall.
- **The QMC Roundabout is a grade separated interchange which is elevated above the Middleton and Clifton Boulevards which join underneath. The A52 joins into this roundabout from the west, and the A6200 Derby Road joins from the east. Slip roads to and from Clifton Boulevard meet the roundabout from the south; likewise slip roads to and from Middleton Boulevards meet the roundabout from the north. There was a pedestrian crossing integrated with the western arm of the QMC roundabout.**

Scheme Measures

2.7. The scheme measures were focused on the four junctions of interest.

2.8. The interventions at each of the four junctions are annotated on the graphics presented as **Figure 2.2** to **Figure 2.5**. The base mapping in each case indicates the pre-scheme arrangements.

Figure 2.2 – Thoresby Road Junction: Scheme Measures

Figure 2.3 – Wollaton Road Junction: Scheme Measures

Figure 2.4 – Priory Roundabout: Scheme Measures

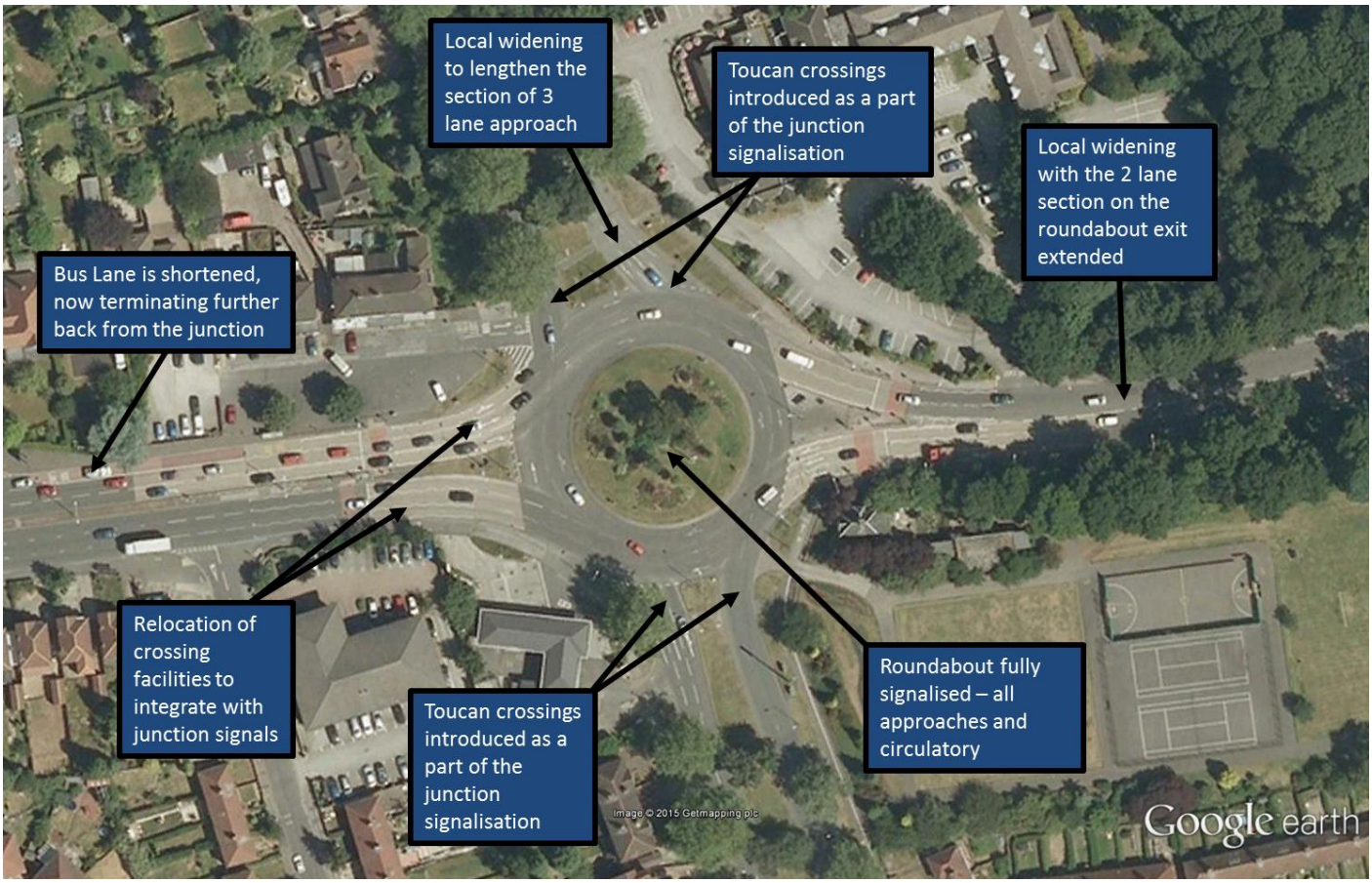
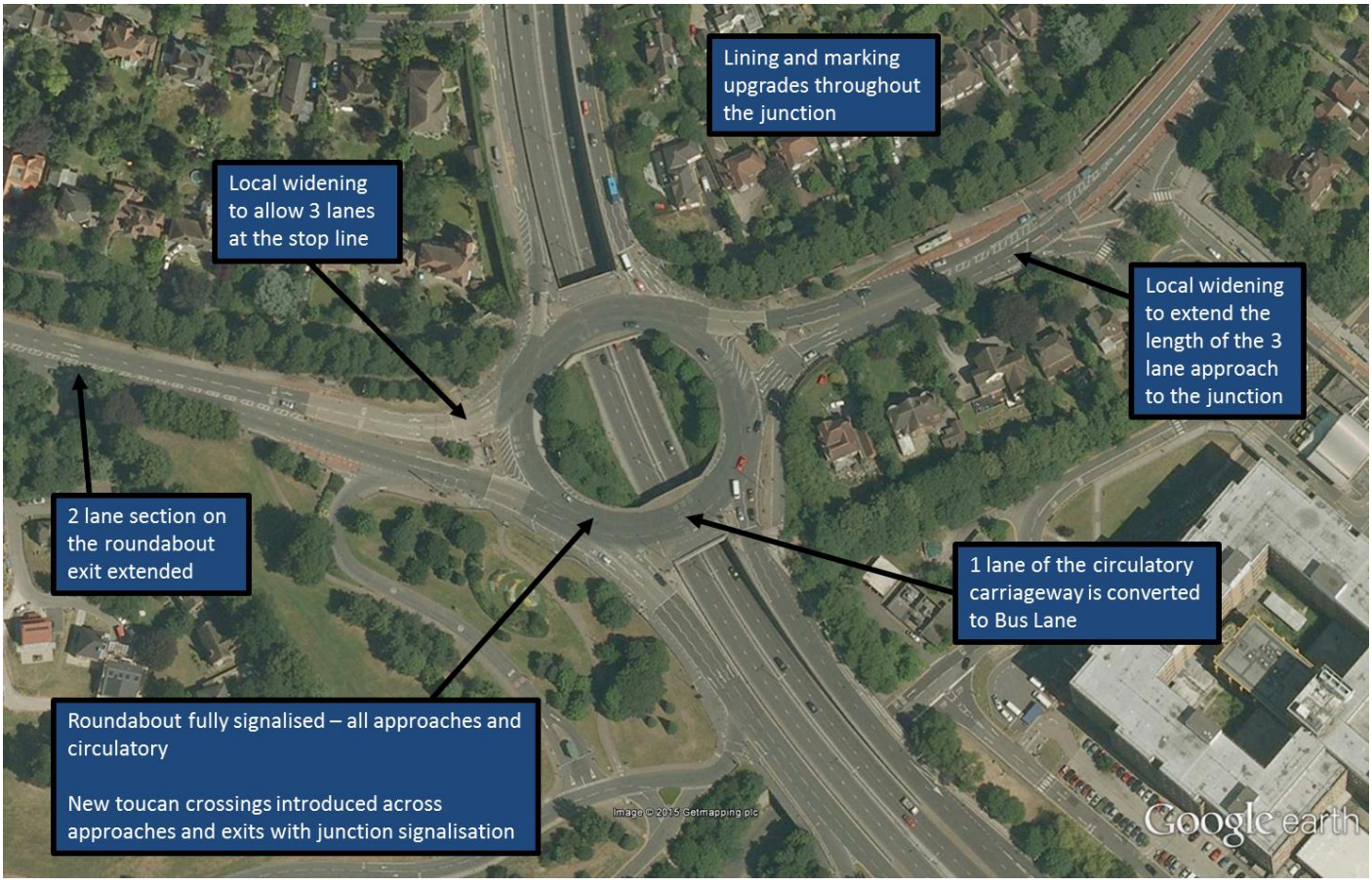


Figure 2.5 – QMC Roundabout: Scheme Measures



Pre- and Post- Scheme Site Comparison

2.9. The following figures highlight key visible differences noted as part of the scheme upgrade, predominantly at QMC and Priory Roundabouts.

A52 WB approach to QMC Roundabout

Pre-scheme

2 lane approach to roundabout

Post-scheme

3 lane approach to roundabout

Crossing on WB approach to QMC

Toucan crossing on WB approach to QMC (Toucans introduced on all QMC approach arms)

QMC Roundabout Circulatory (A52 East to A52 West – WB on roundabout)

Pre-scheme

No bus lane on circulatory carriageway

Post-scheme

Bus lane on circulatory carriageway

QMC Roundabout Circulatory (A52 Westbound exit)

Pre-scheme

2 lane exit to WB exit

Post-scheme

2 lane + bus lane on WB exit.

QMC Roundabout Circulatory (A52 Eastbound entry)

Pre-scheme

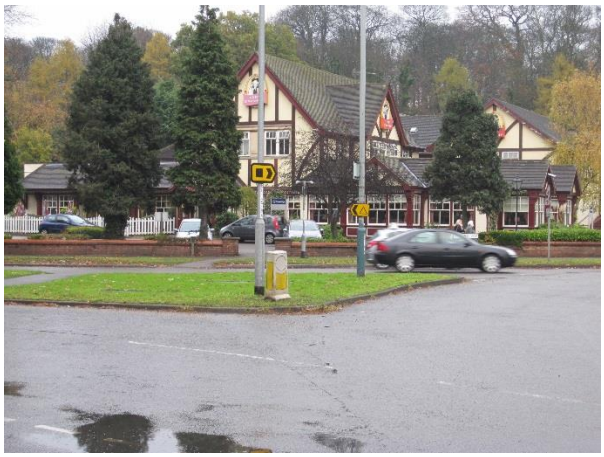
2 lane entry to QMC Rbt from A52 EB

Post-scheme

Widened to 3 lane entry to Rbt with 2 right turn lanes

Priory Roundabout – NB exit

Pre-scheme



Rbt not signalised, no crossing facility

Post-scheme

Toucan crossing facility introduced

Priory Roundabout – Circulatory

Pre-scheme

Post-scheme

Free flowing circulatory traffic

Circulatory signalised

Priory Roundabout – SB approach (Wollaton Vale)

Pre-scheme

2 lane on SB approach to Priory Rbt (looking away from roundabout)

Post-scheme

Approach widened to 3 lanes with crossing (looking towards roundabout)

Priory Roundabout – A52 WB exit

Pre-scheme

A52 WB exit (no crossing on EB entry)

Post-scheme

Revised layout to A52 WB exit crossing with guardrails to reach staggered crossing point on A52 EB entry

Post-Scheme Site Observations

2.10. A site visit was undertaken during the morning of Tuesday 21st July 2015. The weather was fine with some very light rain. There were no known incidents or additional roadworks close by on the network over and above those set out in Section 1 paragraph 1.8 which would mean that traffic activity was atypical. It should however be noted that the overall traffic flow could be slightly lower than at other times of the year as a result of the start of the summer holiday period.

2.11. All of the scheme elements were seen to be in place and operational. Some of the road markings were beginning to fade; a result of the scheme having been in situ for over two years, and the high level of traffic which uses the area.

2.12. Generally, traffic operations at all the junctions appeared to function well. No major queues were noted on the approach to any junction. There was some reduction in traffic speeds exiting the eastern arm of Priory Roundabout. This was caused by the link narrowing from two lanes to one lane. It should be noted however that whilst speeds were slower, there was never any need to stop.

2.13. The scheme provides good quality NMU facilities for both pedestrians and cyclists. Notably, the quality of the crossings are very high.

2.14. The QMC Roundabout junction is located adjacent to the Queen's Medical Hospital meaning there is a high footfall of pedestrians in the area. Furthermore, the A52 is a high frequency bus corridor used by multiple operators and services. Provisions for bus boarding and alighting are appropriate and are complemented by safe crossing provisions for bus users.

2.15. At Priory Roundabout, the introduction of signalised crossings on all approach arms provides NMUs with a safer and secure environment for crossing the junction. A high number of pedestrians were noted at this junction, particularly crossing from the adjacent residential estate to use the petrol station located on the roundabout.

2.16. The introduction of the westbound bus lane on the QMC Roundabout appears to function well, providing extra capacity for buses travelling westbound through the junction and ensuring that buses do not block back and impact junction efficiency. As noted, the route acts as a high frequency bus corridor used by multiple operators and services.

Stakeholder Feedback

2.17. While the analysis in this report can consider the quantifiable impact of this scheme based on empirical data, it is also appropriate to consider the opinions of major stakeholders of the scheme. For example, a scheme may save journey times in practice, but if this saving isn't perceived, the scheme may not be as successful as first thought.

2.18. The major stakeholders contacted for feedback on the A52(T) West of Nottingham Corridor scheme are:

- Area 7 area team – A-One+;
- Highways England; and
- Nottinghamshire County Council.

2.19. Additional feedback was received from the Greater Nottingham Cycling Development Group – however the response is not directly related to this scheme. It has been included for wider views on how the scheme addresses local issues. This feedback also relates in part to comment made by Nottinghamshire County Council.

2.20. The remainder of this section outlines the responses received from these stakeholders.

Area 7 area team – A-One+

Team Leader – LNMS Economy Studies

2.21. "I have not had much direct involvement with the scheme but have had some understanding and experience of it. From my view the scheme has generally delivered positive improvements to the junctions and in particular at Priory and QMC Roundabouts where there has been both a capacity gain but also a perceptible safety improvement; the latter particularly due to the much more ordered nature of the junctions.

2.22. The replacement of a number of existing signal installations with more energy efficient Extra Low Voltage (ELV) installations has also resulted in lower energy use.

2.23. However the scheme has somewhat been overshadowed by a lack of link capacity on the single carriageway section between Priory and QMC Roundabouts which causes queuing back onto and through both roundabouts. The original assessments appeared to assume that this section would continue to operate as an informal 2+1 tidal flow system, as it did before the scheme. However the improvements to the roundabouts has resulted in more free-flowing traffic on the junction approaches which ironically means that, as they are now not queuing along the link, drivers only use it as a single lane in each direction downstream of the junction exit merges.

2.24. We are now looking into feasibility of further options to improve this link such as formal tidal flow systems."

Traffic Signals Specialist

2.25. "I fully support [the Team Leader's] comments and will add some of my own, based on a more detailed involvement from its inception, prior to A-one+ commencing the Area 7 commission in 2009, through to the early stages of implementation.

2.26. I would add for the avoidance of doubt that the whole scheme involved not only the Priory and QMC Roundabout signalisations but also the conversions to Mova control of the Wollaton Road and Thoresby Road T-junctions, and also the conversion of four dual Puffin crossings on the dual section of the A52 to Mova as their normal method of control, likewise the 3 single Puffins between the two roundabouts. A new red/green man facility over the A52 on the west arm of the Thoresby Road Junction was also provided.

2.27. In general, the enhanced and additional pedestrian/cyclist facilities throughout the length of the scheme was a major benefit.

2.28. In particular, the very important crossing facilities at the roundabouts were a major advance on previous provision, which, at QMC, previously consisted of free-standing Toucan crossings over the four arms which could sometimes detract from the entry capacities of the roundabout Give Ways. The crossings are now incorporated into the overall roundabout control and do not impact to the same extent on the operation of the junction as a whole. They are also better aligned with user desire lines and, on the entry crossings, give much more generous opportunities to cross.

2.29. Much the same applies at the Priory Roundabout, where there are now crossings over all 4 arms, compared to only over the A52 arms previously. Of these, the A52 western arm crossing had to remain as a Puffin due to very restricted central reservation width but the other three are all Toucans (like the original one over the A52 eastern arm).

2.30. The focal limitation on what could be achieved remains the single-carriageway section between the two roundabouts. The original modelling for the scheme was done for the previous MAC, AMScott, by SIAS Ltd, the originators of the Paramics model used. Even they had difficulty in accurately modelling the section between the roundabouts, for the reasons Mark describes. Because of residual concerns about this limitation at the time of the scheme design, every effort was made to achieve the absolute maximum merge length possible from each roundabout into the single-carriageway section, in order to minimise possible interference of merge queuing with roundabout operation due to exit blocking.

2.31. Clearly we were not totally successful in avoiding the problems of exit blocking interfering with the roundabouts at peak times. However, this problem was not instigated by the scheme but occurred previously and to a greater extent, when the merges were much shorter. It is true to say that the extent of congestion is now more confined to the peak single hours, rather than to more extensive periods in each peak that were previously affected.

2.32. It is also true to say that the greater efficiency of the Thoresby Road Junction has focused eastbound A52 queuing in the AM peak more on the Bramcote-to-Priory section than was previously the case, when queuing often extended back through the Bramcote junction almost to the Bardills junction, about one mile further west from Bramcote.

2.33. The remaining congestion during the weekday peak single-hours due to the single-link capacity limitations should not detract from the benefits of the much smoother and more comfortable operation of this length of the A52 at all other times of the week.

2.34. It is also worth adding that the whole period since the completion of the scheme has been accompanied both by extensive works on the A453 scheme, which has probably caused some diversion of extra traffic via A52, and also by the major disruption to the network on the west side of Nottingham caused by the construction of the NET tram phase 2, especially on the directly parallel University Boulevard, which has almost certainly caused diversions via A52 over the length of the scheme.

2.35. Both these disruptive elements have just been completed and it will be very instructive to study the effects in the Autumn, when hopefully a rebalancing of A52 demand, both by route choice and by mode choice, may provide some reduction in the impact of the link capacity limitation between the two roundabouts."

Traffic Signals Specialist

2.36. The responses [above] cover the key issues and I would concur with their assessment. I would just add a few additional comments.

2.37. The Wollaton Rd junction was significantly improved by the addition of MOVA control and now operates with reduced delays on the side road and also the right turn off Derby Rd. The latter is particularly significant as the right turn lane is short relative to the demand; MOVA reduces the tendency to overspill into the through lane, which benefits overall capacity, and may also have a safety benefit.

2.38. I agree that the link between Priory and QMC is the principal issue, which results in exit-blocking at both roundabouts at peak times. We are confident that without the exit-blocking both roundabouts would have satisfactory capacity and would perform well, as they do outside peak times.

2.39. I would emphasise [the above] comments on network disruption due to other major schemes. The tram works in Beeston were very close to A52 and had substantial impacts on local traffic and on the parallel radial routes i.e. A6005 and other minor roads well used by commuter traffic. I certainly have the impression that since the local network has returned to normal the A52 has been running better. It will be interesting to see if this is substantiated by flow data and whether this could affect your conclusions on the performance of the scheme.

Highways England

2.40. The scheme Project Sponsor and Asset Manager were both approached for comments on this scheme. No feedback was received from the Project Sponsor.

The Asset Manager advised about ongoing meetings with the Cycling groups regarding their ongoing concerns. No scheme specific feedback was provided.

Nottinghamshire County Council

Network Manager South: Environment and Resources Department

2.41. "It has been noted that A52 / Wollaton Road Junction has been letting more traffic through towards Nottingham on the A52 in the morning. This causes increased congestion towards, through and after A52 / A6464 / Wollaton Vale (Priory Island). Congestion on the towards Nottingham section of the A52 between Priory Island and QMC junction appears to have stayed at similar levels to pre-scheme but this has a more significant effect on Priory Island junction now it is signalised.

2.42. Congestion and queuing on the A52 towards Derby in the evening peak period appears to have reduced."

Principal Officer LTP and Travel Planning, Transport Planning and Programme Development Team

2.43. "Your request for feedback regarding the A52 scheme has found its way to me. My involvement in the project purely relates to its impact (both good and bad) on sustainable transport issues which, I appreciate, weren't part of the initial brief for the project. I'm afraid that my own comments regarding this aren't positive.

2.44. While I accept that liaison with the county council may have taken place through a colleague, my recollection of events is that consultation was mainly carried out with the city council despite most of the route being in the county. I believe that my colleague David Pick may have had some involvement but again my recollection is that this was very much last minute after this oversight was identified.

2.45. Of greater concern is the apparent lack of interest in NMU amenity along the route. Again, my recollection is that the needs of cyclists and pedestrians was completely overlooked in the design of the scheme and an NMU audit was only carried out once the scheme had been constructed, by which time most of the issues couldn't be addressed because the scheme was already in place. I believe that none of the issues raised in the audit have, to date, been actioned/resolved.

2.46. I won't provide chapter and verse on this subject for the simple reason that your request for feedback has been passed on to the local cycling pressure group Pedals who will no doubt provide you with more detail. I should note, however, that it was the failings of this particular scheme to engage with local NMU interest groups and to take account of their concerns that contributed in no small part to Kam Khokar being required to meet with the local Cycle Development Group to agree a way to improve communications and the means of feeding into these schemes.

2.47. I'm sorry that I've little positive to say. I'm sure that the scheme has delivered many appreciable benefits but from this particular perspective it is hard to find anything positive to say. The scheme has certainly not delivered much of benefit for pedestrians and I struggle to think of any improvements for cyclists either."

Greater Nottingham Cycling Development Group
Chief Executive – the Big Wheel, RideWise and TravelRight

2.48. "I have been passed your request for feedback by Nottinghamshire County Council.

2.49. I chair the Greater Nottingham Cycling Development Group which has members from the local Councils and cycling interest groups. We act as an advisory group to the Councils and more recently have had more interaction and collaboration with Highways England. Although I can understand you are specifically looking at the scheme from the perspective of the impact of reduced length bus lanes and revised signalling arrangements I feel it is important to make a response on behalf of the GNCDG.

2.50. It was very disappointing that the A52 West NMU study, which was done separately and after the main highways scheme, was not done in an integrated way. The scheme has provided little or no benefit to cyclists and is still a great barrier to local ambitions of increasing the amount of commuters using cycles. I understand there have been few cycling accidents in the area but that does not show the true picture with cyclists

- taking their life in their hands especially westbound where there are no bus/cycle lanes;
- riding on footpaths; and
- avoiding cycling.

2.51. A more integrated approach to the NMU study, in line with present Highways England policy, might have provided more opportunities to:

- integrate cycling related improvements into the main programme at a low cost
- support cycling at junctions and crossings of the road
- provide more cycling space either on the A52 or its footpaths
- divert cyclists onto safer and quieter alternative routes.

2.52. From our perspective this overall scheme is unfinished and we will be continuing our lobby to get this main artery into the city more cycle friendly and to have alternative routes for cyclists. We realise that it will be hard to justify large schemes as road safety and congestion are the major issues from your perspective however we believe there are several low cost options to improve the cycling infrastructure along the A52 West."

3. Traffic Volumes

Introduction

3.1. This section of the report considers the impact that the A52 West of Nottingham Corridor LNMS has had on traffic volumes.

Data Source

3.2. Three sources of traffic count data have been identified to assist the scheme evaluation, as follows:

- Continuous ATC data collected on the A52 as collected by Highways England (as identified in the TRADS data). There are sites in both directions of the A52 within the corridor section affected by the scheme, between Priory Roundabout and QMC Roundabout. The sites have been live since 2004 and continuously collect data up to the present day (with the exception of 3 months; Oct-Dec 2010);
    - A52 westbound – site number 30014835 (April 2004 – present)
    - A52 eastbound – site number 30014834 (April 2004 – present)
- A 12 hour turning count commissioned by the POPE team for the QMC Roundabout, undertaken on 7th July 2015; and
- A series of peak period junction turning counts at Thoresby Road Junction, Wollaton Road Junction and Priory Roundabout. This data was collected on 21st November 2006, for the AM (07:00-09:30) and PM (15:30-18:30) periods only. These counts were a key data source used to develop the traffic modelling work used to generate the scheme impact forecasts.

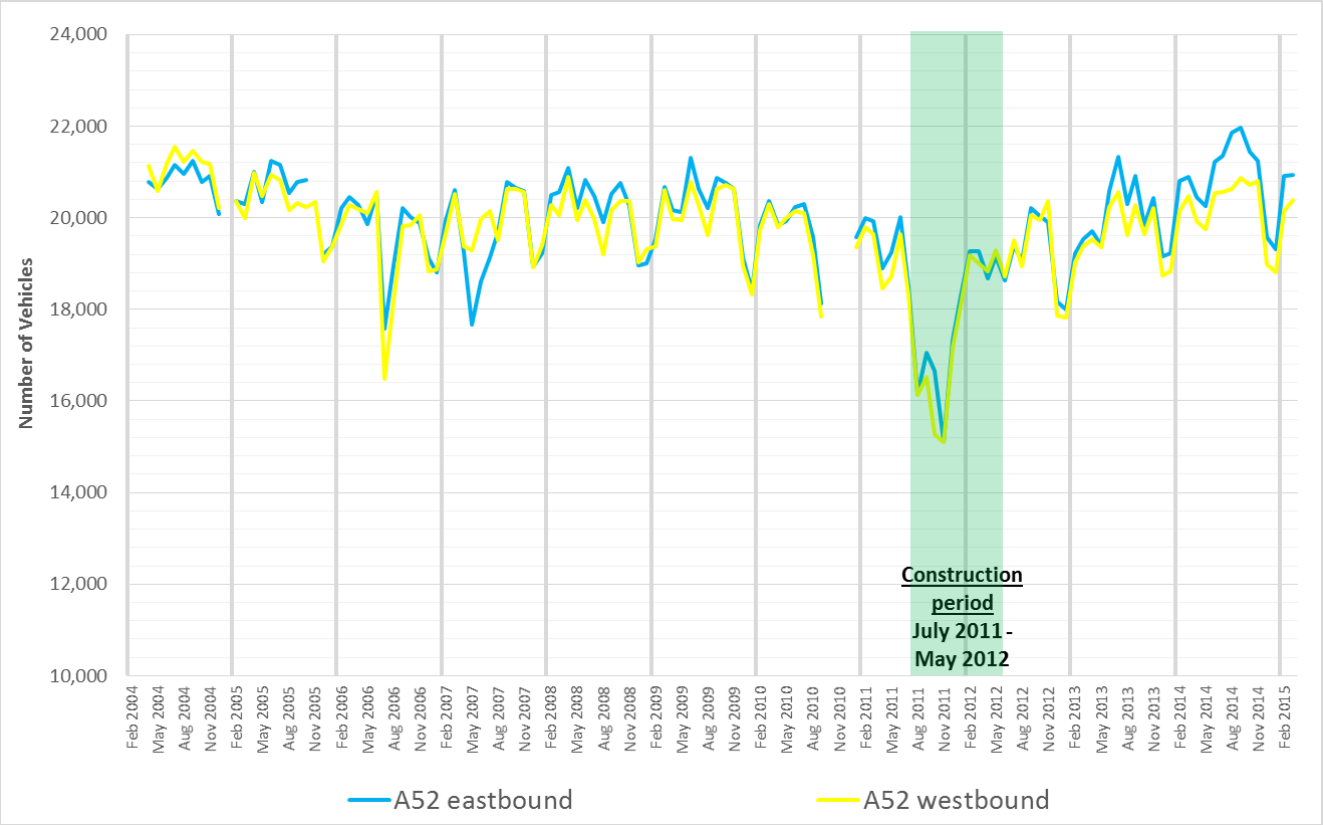
Traffic Volume

3.3. As scheme planning and construction is a process that takes a number of years, it is important to understand how traffic volumes have changed over time and whether this will impact the way the scheme performs. To understand this, the two A52 TRADS sites have been analysed to look at traffic trends in both directions before and after scheme completion.

3.4. In addition, the evaluation team are aware of potential traffic re-routing caused by the start of works on the nearby A453 widening scheme which started construction in January 2013. Although located to the south, the A453 is a radial corridor which offers a similar trip potential to the A52, linking the M1 and Nottingham City Centre. It is noted that some travellers may have chosen to divert onto the A52 since the start of the A453 works to avoid delays created by the construction traffic management, particularly as this is highlighted as an alternative route on the Highways England website.

3.5. The Average Weekday Traffic (AWT) for these sites, by direction, is shown on a monthly basis in **Figure 3.1.**

Figure 3.1 – Long-Term Average Weekday Traffic Trends – A52 TRADS Site



3.6. The data shows that traffic flow patterns have remained relatively consistent before and after the implementation of the scheme with some fluctuations through each 12 month period. The vehicle flow shown experiences seasonal variation, with lowest traffic levels during the summer and winter months. This is typical across the highway network with summer coinciding with the main holiday and off-school season, and the winter providing poor weather conditions reducing overall traffic on the network.

3.7. Since the scheme opened, there appears to have been a gradual rise in traffic volume. However as described previously, some of this growth may be due to traffic rerouting during the construction period of the nearby A453 widening scheme.

3.8. Actual increases in traffic volumes appear to have been immediately from the start of those works (January 2013), however there may have been a gradual increase in the level of traffic management and disruption in the other corridor which meant that drivers were not compelled to re-assign immediately from the start of 2013 but instead made route changes over a longer period.

3.9. Alternatively the growth may relate to increasing numbers of vehicles on the road causing background traffic growth.

3.10. The chart demonstrates that the traffic flow is balanced in each direction, however the growth since 2013 is most prevalent in the 'inbound to city' eastbound direction.

3.11. **Table 3.1** demonstrates how the traffic volumes have changed, presenting Average Daily Traffic (ADT) across a 12 month period before and after scheme opening.

Table 3.1 – Pre- and Post-Scheme Changes in Average Daily Traffic

Period	A52 EB ADT	A52 WB ADT	2-way ADT
October 2009 – September 2010 (pre-scheme year *using available data*)	19,764	19,640	39,404
June 2012 – May 2013 (immediate post-scheme year)	19,272	19,210	38,481
Difference to pre-scheme			*-923 (-2.3%)*
June 2013 – May 2014	20,348	19,867	40,215
Difference to pre-scheme			*+811 (+2.1%)*
April 2014 – March 2015	20,880	20,175	41,055
Difference to pre-scheme			*+1,651 (+4.2%)*

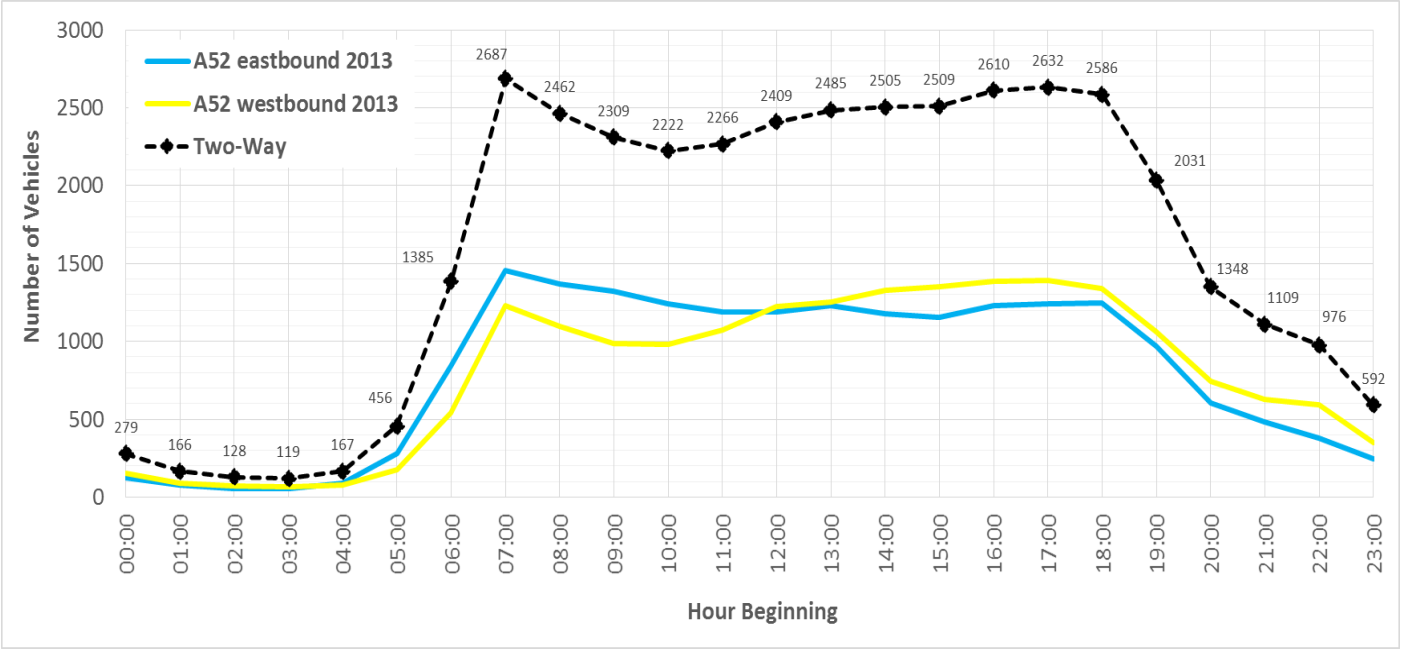
3.12. Table 3.1 shows how the traffic patterns have changed since the scheme opened, and highlights that the scale of these changes has been relatively small (less than 5%). This small change is not sufficient to conclude that the scheme has had any effect on traffic levels.

Daily Traffic Patterns

3.13. By studying the daily traffic patterns, it is possible to identify peak periods of demand along the A52 corridor. This will help to understand when delays might be expected.

3.14. To investigate the daily profile of traffic in the area, the permanent TRADS site has been used. **Figure 3.2** presents the profile for the average weekday across the post-scheme year (June 2012 – May 2013).

Figure 3.2 – Average Weekday Hourly Traffic Flow on the A52



3.15. In summary:

- AM Peak traffic along the link is experienced between 07:00 and 08:00;
- PM Peak traffic along the link is experienced between 16:00 and 19:00;
- The link is busiest during the morning peak, however this is only a marginal difference compared with the traffic volumes recorded in the PM peak;
- The differences between the AM and PM peaks and the Inter Peak period are not significant and traffic volumes are relatively high (over 2,200 two-way flow) throughout the daytime; and
- There is a slight tidal affect within the flow profiles with eastbound traffic (inbound towards Nottingham City Centre) being largest in the morning and westbound being greater in the afternoon and evening. This suggests the importance of the route for commuters accessing/egressing the city centre.

3.16. Daily profile information for Saturdays and Sundays is presented in **Figure 3.3** and **Figure 3.4.**

Figure 3.3 – Average Saturday Hourly Traffic Flow on the A52

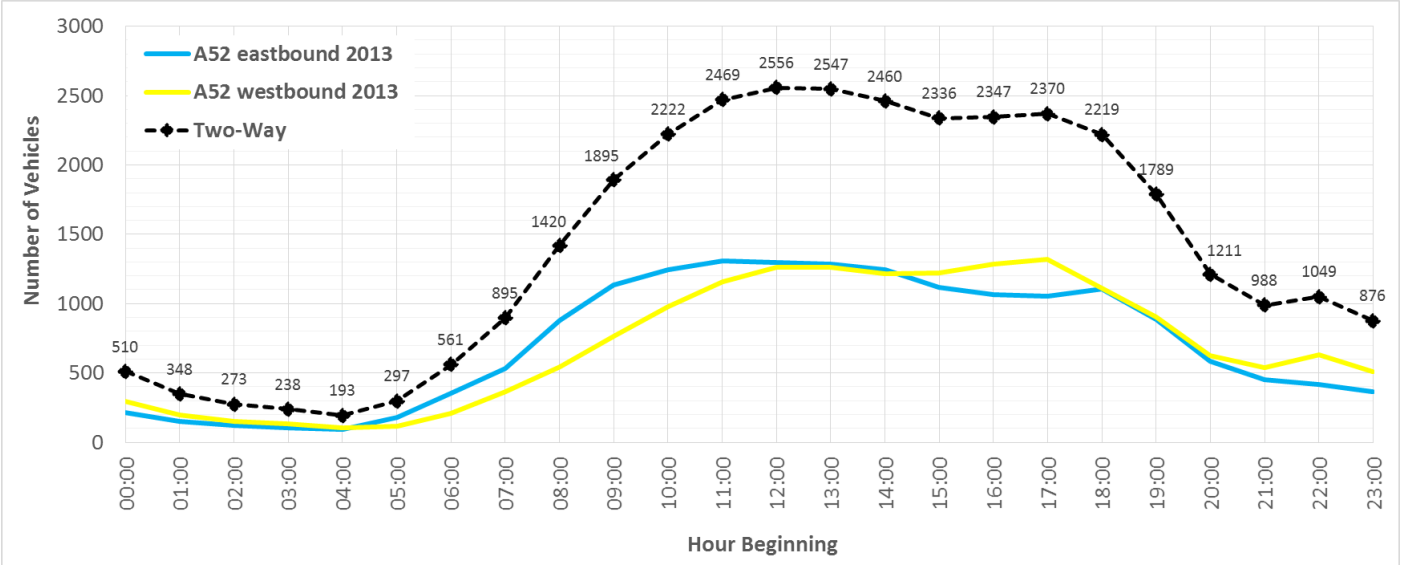
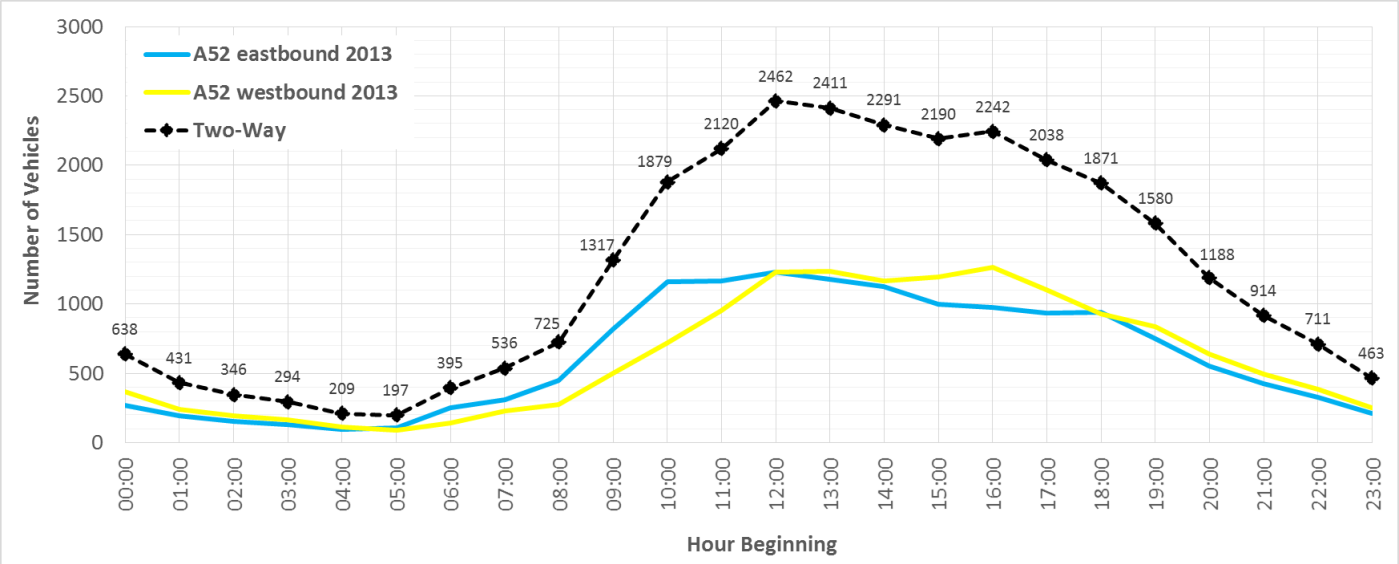


Figure 3.4 – Average Sunday Hourly Traffic Flow on the A52



3.17. In summary:

- On Saturdays, traffic flows are shown to increase gradually from overnight levels throughout the morning (starting at 06:00), reaching peak levels at around midday. Flows remain at a similar level through to 17:00, and drop away after this time, to around 21:00 when typical overnight conditions begin;
- Sunday traffic starts to increase from overnight levels after 07:00, rising to a peak at midday. Flows remain in excess of 2,000 vehicles per hour (two-way) until 18:00 and reduce gradually throughout the evening period. The profile is similar to a Saturday, although the reduction in flow is more gradual between 19:00 and 21:00; and
- Saturday and Sunday traffic volumes are similar to weekdays, highlighting that the corridor is a key radial corridor used throughout the week. As with weekdays, eastbound traffic flows are higher than westbound during the mornings but this pattern reverses through the afternoon and evening.

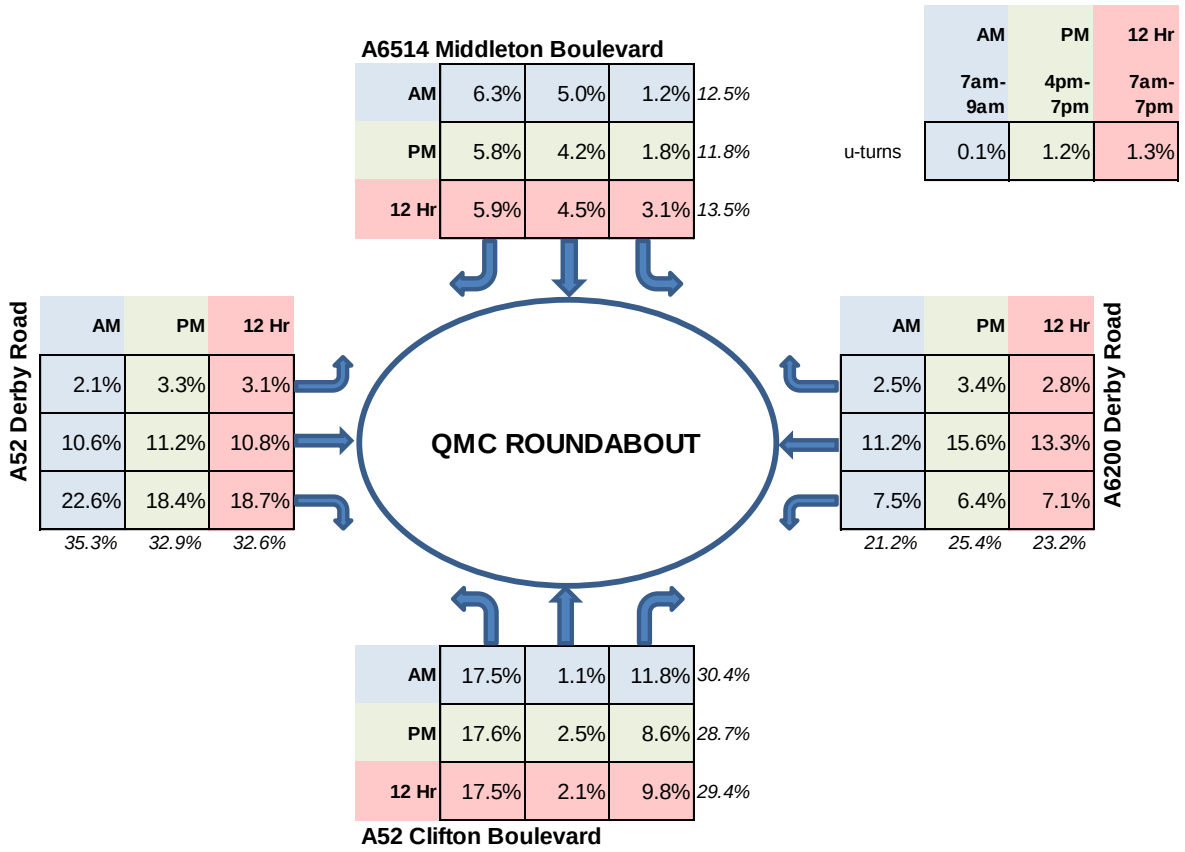
Traffic Turning Movements

3.18. Turning movement proportions have been identified from traffic count data. For the QMC Roundabout, the July 2015 count has been used. For the Priory Roundabout, proportions observed in the 2006 peak hour count is the most recent data available to the post-opening evaluation team.

QMC Roundabout

3.19. Turning proportions across the whole junction, as observed in the 12 hour July 2015 turning count by time period, are presented in **Figure 3.5.**

Figure 3.5 – QMC Roundabout Turning Proportions (July 2015)



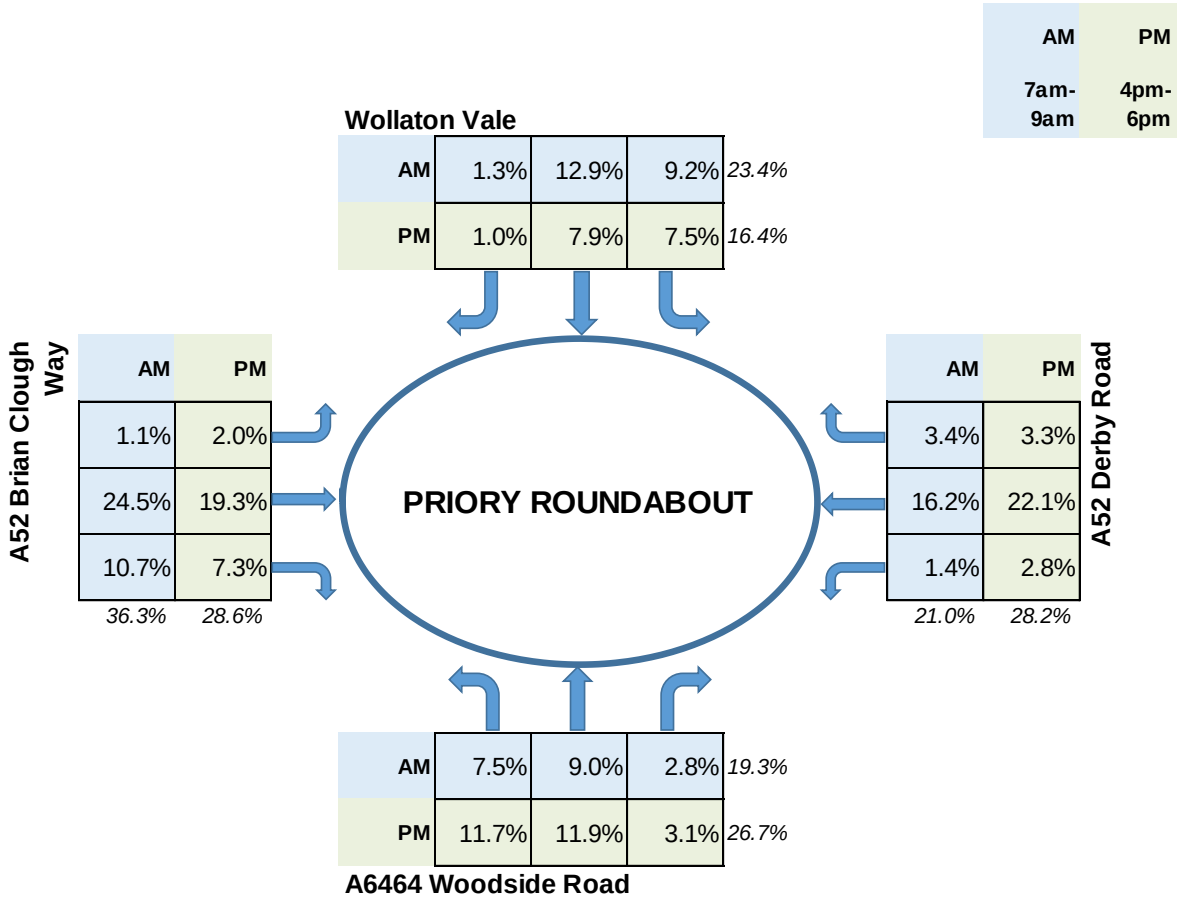
3.20. In summary:

- The most dominant movements are between the South and West arms of the junction (i.e. 'along' the A52). Between them, these two movements account for over 35% of the traffic travelling through the junction during the 12 hour period; and
- The A52 Derby Road eastbound approach is the busiest during all time periods and accounts for 32-35% of all arrivals during each time period. The A52 Clifton Boulevard northbound approach accounts for 28-30% of entries. The A6514 Middleton Boulevard southbound approach is shown to carry the lowest approach flows.

Priory Roundabout

3.21. Turning proportions, as observed in the November 2006 turning count, are presented in Figure 3.5.

Figure 3.6 – Priory Roundabout Turning Proportions (November 2006)



3.22. In summary:

- The most dominant movement is the East – West (and vice versa) across the junction along the A52. These two movements account for over 55% of the traffic travelling through the junction during both the AM and PM peak periods;
- In the AM Peak, the eastbound approach along the A52 is the busiest approach accounting for 36% of arrivals. The northern arm (Wollaton Vale) is second busiest carrying 23% of arrivals. The A52 westbound approach carries 21% of AM Peak traffic which is slightly more traffic than the A6464 Woodside Road approach from the south which carries 19.3% of traffic; and
- In the PM Peak, the two A52 approach arms carry similar levels of traffic, at approximately 28%. The southern approach carries slightly lower traffic volumes than these A52 approaches, 27% but the Wollaton Value arm to the north is significantly quieter (16%).

Summary

- Based on an assessment of a count on the A52 mainline, AM Peak traffic in the corridor is experienced between 07:00 and 08:00 with PM Peak conditions between 16:00 and 19:00;
- The link is busiest during the morning peak, however this is only a marginal difference compared with the traffic volumes recorded in the PM peak;
- Flows are similar between the weekday peaks and Inter Peak, highlighting the strategic and local importance of the corridor;

- There is a slight tidal affect within the flow profiles with eastbound traffic (inbound towards Nottingham city centre) being largest in the morning (before lunchtime) and westbound being greater in the afternoon and evening;
- Saturday and Sunday traffic volumes are similar to weekdays, with peak flows observed at midday. Flows drop away through the afternoon;
- Turning movements at the QMC Roundabout show that the movements between the two A52 approaches dominate (West and South arms). The northern arm is the quietest approach; and
- Turning movements at the Priory Roundabout show that distributions are relatively even across the four arms. In the morning, the A52 eastbound approach arm is busiest, followed by the Wollaton Vale approach from the north. In the afternoon, the two A52 approaches are the busiest and carry similar levels of flow.

4. Journey Time Analysis

Introduction

4.1. As an economy scheme, the key justification for this LNMS is a journey time benefit for road users. The scheme has signalised the Priory Roundabout and QMC Roundabouts and introduced MOVA at two of the major signalised junctions on the selected corridor of the A52; Thoresby Road and Wollaton Road. Furthermore, four dual puffin crossings on the dual section of the A52 now have MOVA as their normal method of control. These measures were designed to improve journey times for vehicles moving through the corridor, especially during peak periods.

4.2. To assess the impact, this report considers evidence from before and after the scheme to ascertain whether there has been a journey time benefit experienced due to the implementation of the A52 West of Nottingham Corridor LNMS.

Data Source

4.3. For the journey time analysis, Sat Nav data has been used to inform pre- and post-scheme journey times. This data is available from some motorists who use satellite navigation devices and allow their data to be used anonymously for the purpose of generating travel statistics. This data can provide intelligence on the operation of the highway network. The data also has the benefit of being historic, so that it is possible to retrieve pre-scheme journey time data after the scheme has opened.

4.4. In order to conduct the analysis, seven time periods have been defined using the diurnal flow profiles presented in Chapter 3 as a guide. The time periods have been defined to combine similar hours in terms of flow levels and trip purposes (commuting/leisure etc). The seven time periods used are listed in **Table 4.1**.

Table 4.1 – Journey Time Analysis: Time Period Splits

24 Hour Flow	Mon-Fri	Sat	Sun
Weekday AM Peak	07:00-09:00		
Weekday Inter-peak	09:00-1500 and 19:00-20:00		
Weekday PM Peak	16:00-19:00		
Weekday PM Shoulder	15:00-16:00		
Overnight	20:00-07:00	20:00-09:00	20:00-10:00
Saturday daytime		09:00-20:00	
Sunday daytime			10:00-20:00

4.5. As the scheme opened in late May 2012, the post-scheme analysis period starts in June 2012. As stated previously, works on the A453 widening scheme, to the south-west of Nottingham, commenced in January 2013. The evaluation team considers it likely that these works could have had a notable impact on route choice for drivers accessing Nottingham, and hence traffic conditions in 2013

may not be wholly typical. As a result the post-scheme evaluation period is limited to 7 months between the completion of the A52 LNMS (end of May 2012) and the start of the works on the A453 (start of January 2013).

4.6. Sat Nav data has been acquired for these time periods over a comparable seven month period before and after the scheme. These periods are defined as:

- Pre-scheme: 1st June 2010 to 31st December 2010 and
- Post-scheme: 1st June 2012 to 31st December 2012.

4.7. To enable a robust appraisal, the pre-scheme evaluation period has been constrained to the same months of the year prior to the start of the scheme construction (i.e. June-December 2010).

Journey Time Comparison

4.8. The journey time saving assessments included within the PAR were assessed using a PARAMICS model where an average network journey time was produced as a model output. Journey time savings were only forecast for the AM and PM peak periods.

4.9. The “do-minimum” average network journey times included in the PARAMICS model were:

- AM peak do-minimum: 7.24 minutes – with a predicted saving of 1.03 minutes resulting from this scheme introduction; and
- PM Peak do-minimum: 7.96 minutes – with a predicted saving of 1.13 minutes.

4.10. To assess the impact of the scheme, journey time analysis using pre- and post-opening Sat Nav data was conducted for the A52 in both directions to allow for a like for like comparison between before and after scheme completion. This is documented later in this chapter.

4.11. For the analysis, the A52 is considered between the A6007 and the QMC Roundabout. As well as analysing the impact on travel along the A52, journey time changes for all turning movements at the Priory and QMC Roundabouts have been isolated and are aggregated into the analysis.

4.12. There are therefore three different analysis areas:

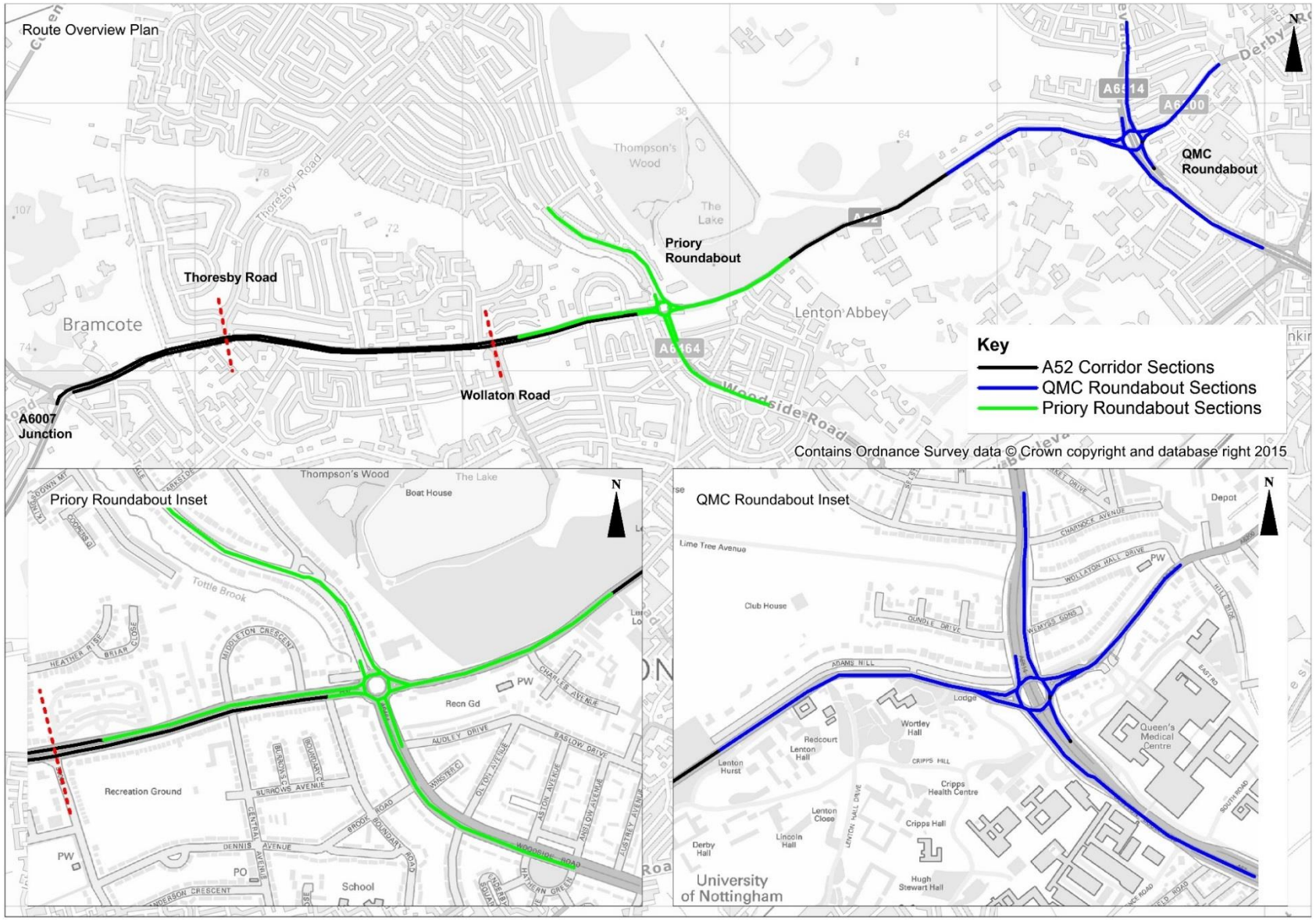
- A52 Corridor Sections – East and West Trips (sub-divided into sections);
- Priory Roundabout – All Turning Movements
- QMC Roundabout - All Turning Movements

4.13. For the corridor analysis, the A52 is divided into sections based on the key junctions under consideration, namely at Thoresby Road, Wollaton Road and the Priory Roundabout.

4.14. To avoid double counting at the Priory and QMC Roundabouts, the approach sections (between 500 to 700m) and the immediate exit sections of these junctions are accounted for within the ‘junction assessments’ but not the ‘along corridor assessment’.

4.15. Figure 4.1 presents the different road sections included within each analysis area. The results set out in the rest of this chapter consider for the three analysis areas separately.

Figure 4.1 – Journey Time Analysis Routes



A52 Corridor Sections

4.16. The impact of the scheme during each of the seven time periods has been considered separately. **Table 4.2** presents the change in journey time per vehicle between the pre-scheme and post-scheme periods for each direction. Negative values indicate a journey time saving and hence a benefit.

4.17. The actual pre- and post-scheme journey times observed in the Sat Nav data are presented in **Appendix A** and **Appendix B** respectively.

4.18. To be clear, the figures reported in Table 4.2 consider only the highway sections marked in black on **Figure 4.1**, and do not account for the local impacts of approaching and travelling through the Priory and QMC Roundabouts.

Table 4.2 – Difference in Before & After Journey Times (secs/veh) – A52 Mainline Sections Only

Segment	Distance (m)	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
Westbound								
QMC Rbt to Priory Rbt	1,238	20.3	32.2	35.3	4.7	-0.6	14.1	4.5
Priory Rbt to Wollaston Rd	558	-14.6	-2.9	-1.6	-2.9	8.0	-3.8	-1.1
Wollaston Rd to Thoresby Rd	1,004	3.0	8.8	6.6	3.6	2.2	-0.3	1.9
Thoresby Rd to A6007 Jct	607	0.6	4.4	2.8	1.9	-0.6	2.4	1.4
Eastbound								
A6007 Jct to Thorsby Rd	696	-16.5	-0.5	0.3	-4.5	-1.3	3.0	-2.0
Thoresby Rd to Wollaton Rd	1,003	52.0	10.7	3.0	7.6	1.6	17.6	-0.2
Wollaton Rd to Priory Rbt	100	6.5	1.6	0.9	0.9	1.4	2.2	0.0
Priory Rbt to QMC Rbt	1,128	10.4	18.6	10.6	8.0	0.2	6.8	3.5

Negative values indicate a journey time saving and hence a benefit. Savings > 20 secs are highlighted in Green. Positive values indicate an increase in journey time and hence a dis-benefit. Increases of > 20 seconds are highlighted in Red.

4.19. The analysis shows that overall there have been increases in journey times along many of the route sections, although in many instances these are relatively small (less than 10 seconds).

4.20. The largest increase is recorded in the eastbound section from Thoresby Road to Wollaton Road during the AM peak (52 seconds slower per vehicle). The link flow between the QMC and Priory Roundabouts is also notably slower during the

PM peak and PM shoulder periods (around 32-35 seconds per vehicle). This is consistent with some of the earlier stakeholder feedback.

4.21. The data also shows that there are some locations along the corridor with improved journey times. This is most significant at the western end of the corridor where eastbound trips towards Thoresby Road Junction are over 16 seconds faster per vehicle in the AM Peak.

QMC Roundabout – Detailed Movements

4.22. The impact of the scheme during each of the seven time periods has been considered separately. Table 4.3 presents the change in journey time per vehicle between the pre-scheme and post-scheme periods for each movement at the QMC Roundabout.

4.23. To be clear, the figures reported in **Table 4.3** consider only the highway sections marked in blue on **Figure 4.1**. The analysis routes include approximately 500-700m approaches to each junction, navigation of the circulatory carriageway, and the junction exit for each arm. Each analysis route ends a short distance away from the junction.

Table 4.3 – Difference in Before & After Journey Times (secs/veh) – QMC R/about Turning Movements

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A6002)	South	-2.0	11.9	13.7	2.8	12.7	15.0	14.9
	West	0.9	21.4	21.3	5.7	14.3	17.1	16.7
	North	1.9	22.5	20.7	7.6	16.9	18.7	18.2
South (A52)	West	17.0	58.1	49.4	13.4	9.4	16.2	9.3
	North	18.1	59.2	48.8	15.3	12.1	17.7	10.8
	East	17.1	59.5	49.8	16.5	14.6	19.8	13.6
North (A6514)	East	1.7	30.5	29.3	23.3	15.4	20.4	20.8
	South	2.9	30.6	29.7	23.3	16.3	21.0	21.5
	West	5.7	40.0	37.3	26.2	17.9	23.1	23.3
West (A52)	North	6.0	16.2	14.5	16.9	12.7	20.1	16.4
	East	5.1	16.5	15.5	18.1	15.2	22.2	19.2
	South	6.3	16.6	16.0	18.0	16.1	22.8	19.9

Negative values indicate a journey time saving and hence a benefit. Savings > 20 secs are highlighted in Green. Positive values indicate an increase in journey time and hence a dis-benefit. Increases of > 20 seconds are highlighted in Red.

4.24. Aside from a minor 2 second benefit during the AM peak between the East to South arms, the analysis shows that conditions at the junction are worse across all time periods and across all journey movements. Journeys in the post-scheme

period are slower on all approach arms, with the most significant impacts in the PM peak and PM shoulder periods.

Priory Roundabout – Detailed Movements

4.25. **Table 4.4** presents the change in journey time per vehicle between the pre-scheme and post-scheme periods for each movement at the Priory Roundabout.

4.26. To be clear, the figures reported in Table 4.4 consider only the highway sections marked in green on **Figure 4.1**. The analysis routes include approximately 500-700m approaches to each junction, navigation of the circulatory carriageway, and the immediate junction exit. Each analysis route ends a short distance away from the junction.

Table 4.4 – Difference in Before & After Journey Times (secs/veh) – Priory R/about Turning Movements

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A52)	South	25.2	20.8	19.5	16.2	9.7	15.8	12.6
	West	24.1	16.3	18.1	15.7	8.0	14.3	12.5
	North	29.9	19.5	19.2	17.8	8.5	16.4	16.6
South (A6464)	West	21.5	-21.3	1.2	9.8	9.1	13.6	9.0
	North	27.3	-18.1	2.4	11.9	9.5	15.8	13.1
	East	31.2	-17.8	2.4	12.1	10.2	16.1	13.1
North (Wollaton Vale)	East	52.0	20.9	19.3	14.1	12.1	13.3	11.4
	South	51.9	24.6	21.5	16.8	15.1	16.2	12.8
	West	50.8	20.1	20.0	16.3	13.5	14.7	12.7
West (A52)	North	63.6	26.2	5.7	14.7	8.1	23.4	10.4
	East	67.5	26.5	5.7	14.9	8.8	23.7	10.5
	South	67.4	30.2	7.9	17.5	11.8	26.6	12.0

Negative values indicate a journey time saving and hence a benefit. Savings > 20 secs are highlighted in Green. Positive values indicate an increase in journey time and hence a dis-benefit. Increases of > 20 seconds are highlighted in Red.

4.27. The analysis shows some minor benefits in the PM peak (around 20 seconds) from the South arm to all other arms – West, North and East. All other movements at all other arms show a dis-benefit from an increase in journey times.

Journey Time Reliability

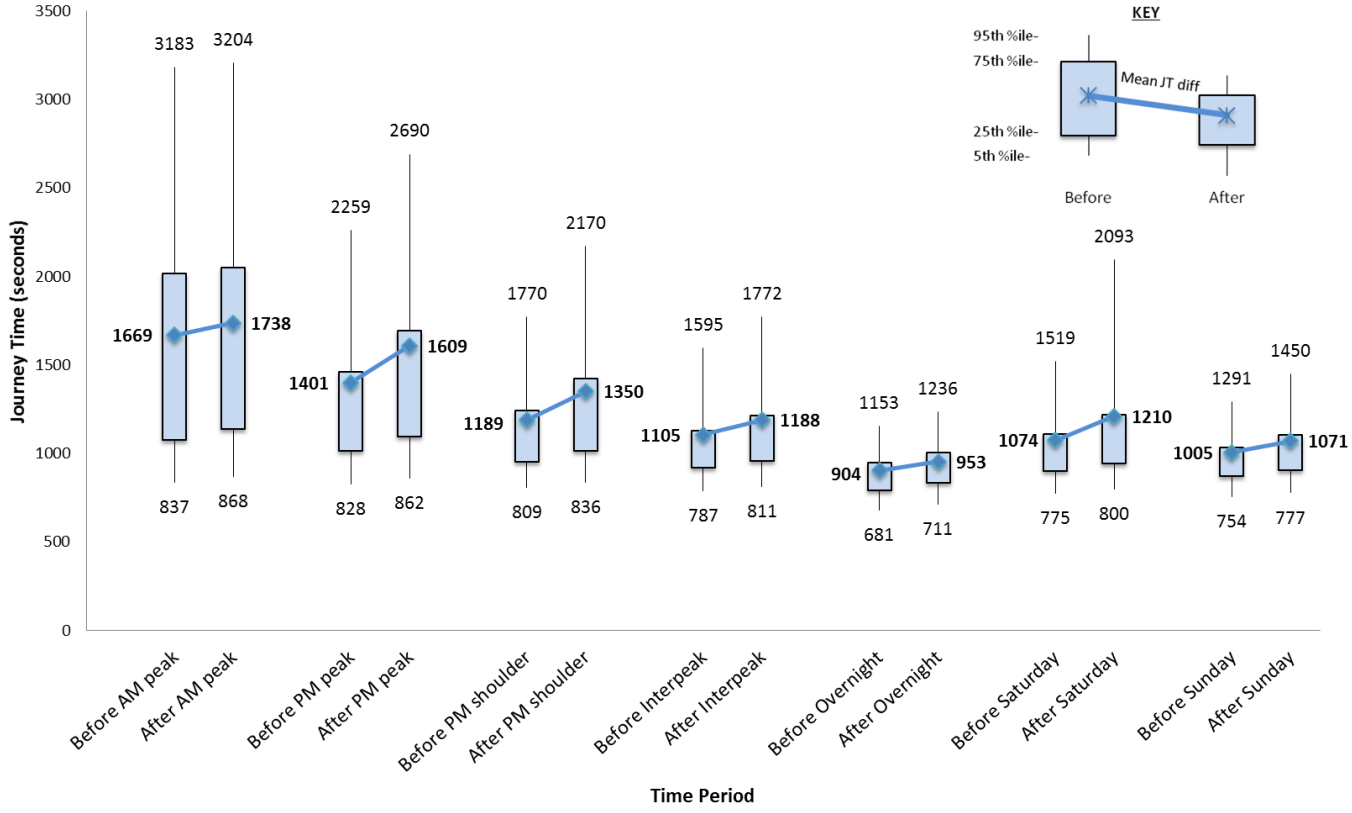
4.28. The Sat Nav data also allows any change in journey time reliability to be quantified, by using the inter-quartile range journey times and the 5th to 95th

percentile journey times. By considering how these ranges have changed from the pre-scheme year to the post-scheme year the reliability of journey times can be assessed.

4.29. The Sat Nav data has been analysed as a single route which starts on the A52 to the south of QMC Roundabout (start of northbound approach to the junction marked blue in **Figure 4.1**) and travels along the length of the route westbound beyond the A6007 junction. The route then performs a u-turn at Bardills roundabout (to the west of the A52 scheme area extents) and repeats the A52 mainline corridor trip in the eastbound direction. The route travels through the QMC Roundabout and terminates on the A6200 (end of eastbound route exiting the QMC Roundabout marked blue in Figure 4.1).

4.30. **Figure 4.2** presents the changes in journey time reliability for this cumulative whole corridor length route made continuously in both directions of travel.

Figure 4.2 – Journey Time Reliability - A52 Corridor Mainline



4.31. In summary, the reliability graph shows:

- During the majority of the week, journey times are shown to be less reliable following the completion of the scheme;
- The exception is the AM Peak, where the ranges of percentile journey times is similar before and after the scheme;
- Reliability in the PM peak and PM shoulder period are both negatively impacted. The 95th percentile journey time in the PM peak has increased by 431 seconds (over 7 minutes) from 2,259 seconds to 2,690 seconds; and
- Saturdays have been adversely impacted, with the 95th percentile journey time increasing from 1,519 seconds to 2,093 seconds.

4.32. Overall, the data conclusively shows that journey time reliability within the A52 mainline corridor has been adversely impacted.

Calculation of annual vehicle hour benefits

4.33. **Table 4.2 to 4.4**, presented earlier in this section, demonstrate how journey times have been predominantly adversely impacted for certain movements and time periods following the scheme's construction. It is assumed that these changes are a result of the scheme measures. Therefore, it is necessary to calculate the number of vehicle hours lost in the opening year, in order to understand and quantify the overall impact for this evaluation.

4.34. Weekly vehicle movement matrices, factored to a Post-Scheme (June 2012-May 2013) AADT are presented in **Tables 4.5 to 4.7**. These present the total vehicle movements in each time period.

Table 4.5 – Total Weekly A52 Link Vehicle Flow by Period

Segment	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
Westbound							
QMC Rbt to Priory Rbt	11,634	20,566	6,766	39,543	25,975	12,475	10,630
Priory Rbt to Wollaston Rd	12,283	25,366	8,351	40,056	25,122	12,443	14,172
Wollaston Rd to Thoresby Rd	14,187	31,689	9,725	46,195	28,972	14,350	16,135
Thoresby Rd to A6007 Jct	20,333	24,511	8,088	64,188	40,257	19,939	13,347
Eastbound							
A6007 Jct to Thorsby Rd	16,918	34,200	10,724	52,873	33,161	16,424	17,697
Thoresby Rd to Wollaton Rd	21,245	22,068	7,499	66,132	41,476	20,543	12,445
Wollaton Rd to Priory Rbt	18,450	20,710	7,140	55,609	34,876	17,274	12,114
Priory Rbt to QMC Rbt	14,120	18,584	5,780	41,612	24,923	12,735	10,454

Table 4.6 – Total Weekly Arm-to-Arm Vehicle Flow Matrices for QMC Roundabout by Period

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A6002)	South	2,767	3,356	1,269	8,256	5,109	2,531	2,117
	West	4,136	8,186	2,543	14,392	8,907	4,411	3,690
	North	913	1,808	644	2,740	1,696	840	702
South (A52)	West	6,483	9,218	3,091	19,956	12,350	6,117	5,116
	North	406	1,287	479	2,401	1,486	736	616
	East	4,355	4,506	1,584	11,329	7,011	3,473	2,905
North (A6514)	East	461	927	310	5,396	3,340	1,654	1,383
	South	1,840	2,187	762	5,079	3,143	1,557	1,302
	West	2,333	3,054	918	6,730	4,165	2,063	1,725
West (A52)	North	785	1,721	580	3,761	2,327	1,153	964
	East	3,922	5,858	1,881	12,283	7,601	3,765	3,149
	South	8,359	9,670	2,767	20,466	12,666	6,273	5,247

Table 4.7 – Total Weekly Arm-to-Arm Vehicle Flow Matrices for Priory Roundabout by Period

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A52)	South	717	2,071	661	2,893	1,814	899	1,140
	West	8,136	16,100	5,662	23,707	14,868	7,364	9,760
	North	1,705	2,383	527	4,868	3,053	1,512	908
South (A6464)	West	3,757	8,490	2,759	15,875	9,956	4,931	4,755
	North	4,507	8,646	2,387	17,851	11,196	5,545	4,114
	East	1,425	2,291	589	5,786	3,629	1,797	1,015
North (Wollaton Vale)	East	4,631	5,447	1,757	12,982	8,142	4,033	3,028
	South	6,502	5,759	1,560	14,394	9,027	4,471	2,689
	West	651	709	176	1,129	708	351	303
West (A52)	North	565	1,454	269	1,482	929	460	463
	East	12,344	14,057	5,259	33,444	20,975	10,389	9,066
	South	5,391	5,334	1,705	20,250	12,700	6,290	2,939

4.35. The traffic volumes presented in **Tables 4.5 to 4.7** have been calculated using a combination of the A52 TRADS site, the July 2015 turning count at the QMC Roundabout and historic turning counts from 2006 as follows:

- For the QMC Roundabout, the July 2015 turning count has been used to identify flows in the AM Peak, PM Peak, PM Shoulder and Inter Peak periods. The TRADS sites have been used to identify how flow over a 12 hour weekday differs from the Overnight, Saturday and Sunday periods and appropriate factors calculated. The turning proportions for the Inter Peak have been applied to these three calculated periods;
- For the Priory Roundabout, the 2006 peak hour turning count has been used to identify flows in the AM Peak and PM Peak. The TRADS sites have been used to identify how flow over these two weekday peaks differs from the PM Shoulder, Inter Peak, Overnight, Saturday and Sunday periods and appropriate factors calculated. The turning proportions for the small amount of Inter Peak which was observed in the count (09:00 to 09:30) have been applied to these other periods; and
- For the A52 link counts, the 2006 peak hour turning counts at Thoresby Road and Wollaton Road Junctions have been used to identify flows in the AM Peak and PM Peak. The TRADS sites have been used to identify how flow over these two weekday peaks differs from the PM Shoulder, Inter Peak, Overnight, Saturday and Sunday periods and appropriate factors calculated.

4.36. The vehicle movements outlined in **Tables 4.5 to 4.7** are multiplied by the differences in journey times outlined in **Tables 4.2 to 4.4** respectively, to identify the total weekly vehicle hour impact.

4.37. Weekly vehicle hour impacts are multiplied by 52 to calculate the annual vehicle hour impacts. The annual resulting vehicle hour impacts are summarised, by location, in **Tables 4.8 to 4.10**.

4.38. A full breakdown of the vehicle hour impacts by arm-to-arm movement is presented in **Appendix C**.

Table 4.8 – Annual Vehicle Hour Savings on A52 by direction

Route	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime	Total
A52 WB	1,602	14,072	4,505	5,124	3,288	2,481	1,177	**32,249**
A52 EB	15,773	8,615	1,349	9,294	1,104	7,739	-42	**43,832**
Total	**17,375**	**22,687**	**5,854**	**14,418**	**4,392**	**10,219**	**1,136**	**76,081**

Table 4.9 – Annual Vehicle Hour Savings for QMC Roundabout by Approach Arm

Arm	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime	Total
East (A6002)	-4	3,694	1,225	1,833	3,185	1,865	1,534	**13,332**
South (A52)	2,779	12,710	3,682	7,093	3,412	2,610	1,354	**33,640**
North (A6514)	281	3,141	953	6,073	2,563	1,648	1,401	**16,060**
West (A52)	1,112	4,118	1,181	9,439	5,050	3,606	2,606	**27,113**
Total	**4,168**	**23,662**	**7,041**	**24,439**	**14,211**	**9,728**	**6,896**	**90,144**

Table 4.10 – Annual Vehicle Hour Savings for Priory Roundabout by Approach Arm

Arm	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime	Total
East (A52)	3,830	5,075	1,811	7,291	2,356	2,081	2,189	**24,633**
South (A6464)	3,585	-5,462	151	6,329	3,375	2,654	1,590	**12,223**
North (Wollaton Vale)	8,826	3,897	1,024	6,401	3,533	1,900	1,050	**26,631**
West (A52)	17,808	8,254	651	12,636	4,946	6,128	1,956	**52,379**
Total	**34,049**	**11,764**	**3,638**	**32,658**	**14,210**	**12,762**	**6,785**	**115,867**

Table 4.11 – Net Annual Vehicle Hour Impacts for A52 Bramcote Corridor Scheme

Route	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime	Total
A52	17,375	22,687	5,854	14,418	4,392	10,219	1,136	**76,081**
QMC Rbt	4,168	23,662	7,041	24,439	14,211	9,728	6,896	**90,144**
Priory Rbt	34,049	11,764	3,638	32,658	14,210	12,762	6,785	**115,867**
Total	**55,592**	**58,113**	**16,533**	**71,515**	**32,813**	**32,709**	**14,817**	**282,092**

4.39. **Table 4.8 to 4.11** demonstrate:

- The net impact of the scheme is a large journey time dis-benefit, with an increase of over 282,000 vehicle hours in the opening year;
- Net journey time increases are observed across the QMC Roundabout, Priory Roundabout, and the remaining mainline sections of the A52; and

- Considering the impacts in detail, there are net increases for all individual junction approach arms and A52 mainline sections. The only sections which experience net improvements at all during the week are the east arm approach to the QMC Roundabout in the AM peak and the southern arm approach to the Priory Roundabout in the PM peak.

Summary

- The data indicates a significant increase in journey times following the introduction of the scheme, meaning the key objective of the LNMS has not been met;
- Dis-benefits are evident through all time periods, and on almost all journey movements. The individual section analysis shows the Priory Roundabout has experienced the greatest change, with 115,867 additional vehicle hours observed in the opening year; and
- Discounting the impacts at the two major roundabouts in the corridor, east-west through movements still accrued over 75,000 additional vehicle hours in the opening year.

5. Safety Impacts

Introduction

5.1. A critical component of any highway scheme is safety. Whilst this scheme is an economy scheme, the upgrades to the route were still intended to deliver accident savings along the route and at the four key junctions.

5.2. This section examines the safety impacts associated with the scheme, and compares the pre and post-scheme opening accident rates to determine whether the scheme has resulted in a safety benefit or dis-benefit.

Data Source

5.3. The PAR used accidents[1] from the five year period 1st April 2003 to 31st March 2008 as evidence for the pre-scheme conditions at the scheme site. The PAR stated that there had been 178 accidents during this period (five years) which is an accident rate of 35.6 per annum and that the scheme aimed to save 2.46 accidents in the opening year.

5.4. In addition to the analysis of the corridor length, accidents at the four major junctions which have been upgraded as part of the scheme are analysed individually. Due to the size of the QMC Roundabout, analysis covers accidents within a 500m radius of the junction. For the Priory Roundabout, Wollaton Road Junction and Thoresby Road Junction, the analysis covers a 300m radius of the junction. The whole corridor and individual junction analysis areas are indicated in **Figure 5.1**.

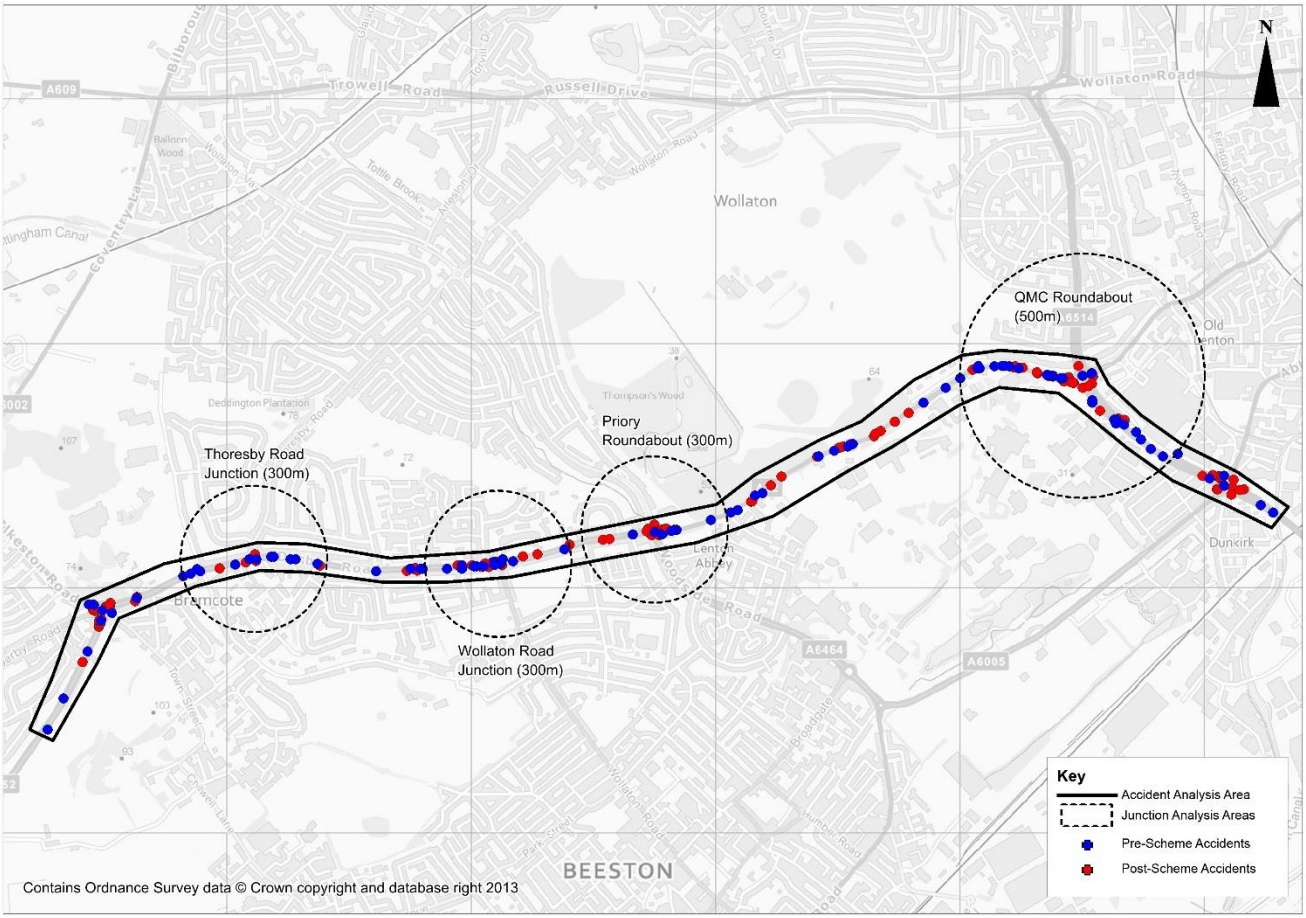
5.5. The PAR covers the evidence used to support the decision to proceed with the scheme, effectively outlining the business case. However, once a PAR has been completed and agreed, there can be a time delay before the start of scheme construction.

5.6. The delay between collecting evidence for a scheme and starting construction means the accident data used to evidence the situation before the scheme is often dated. As such, to understand just the impact of the scheme, a five year pre-construction accident analysis represents a better comparison to the outturn accident rate, and hence representation of scheme impacts.

5.7. For this scheme, the PAR used accident data up until March 2008. However, scheme construction did not begin until July 2011. Therefore, there are 39 months between the evidence and the scheme, during which time the accident rate could have changed.

[1] All references to accidents in this report refer to Personal Injury Collisions (PICs).
The accident data referred to in this report has not necessarily been derived from the national validated accident statistics produced by Department for Transport (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 non-validated data and, as it is sourced from Local Processing Units through the Managing Agent Contractors or Asset Support Contractors, it is sufficiently robust for use in this context.

Figure 5.1 – Accident Analysis Area



Pre-Scheme

5.8. To understand the impact of the scheme, accident data has been analysed for the same extents as used in the PAR for a period of five years directly before construction began (July 2006 to June 2011).

5.9. The results are presented in **Table 5.1** which shows that 240 accidents occurred along the full route during the revised five year pre-scheme opening period; equivalent to 48.0 accidents per year. This is a 4.4 accidents per year increase on the pre-scheme accident rate recorded in the PAR. Accident locations are shown in **Figure 5.1**.

Table 5.1 – 5 Year Pre-Scheme Accident Summary

Location	Slight	Serious	Fatal	Total	Rate	Severity Index
Whole Corridor	210	30	0	**240**	48.00	12.5%
QMC Roundabout	57	8	0	**65**	13.00	12.3%
Priory Roundabout	36	3	0	**39**	7.80	7.7%
Wollaton Road Junction	22	1	0	**23**	4.60	4.3%
Thoresby Road Junction	20	5	0	**25**	5.00	20.0%

5.10. Of the 240 pre-scheme accidents, 30 were recorded as serious giving a severity index of 12.5%.accidents. There were no fatal accidents within the corridor.

5.11. Of the individual key junctions, the worst severity index is observed at Thoresby Road Junction where one fifth of accidents were serious; equivalent to one each year.

5.12. The predicted opening year accident saving remains 2.46, as given in the PAR.

Construction

5.13. It is important to consider the effect of construction on accidents. While this is not typically monetised in LNMS evaluations, it is informative to consider whether the construction process introduces accidents to the road network.

5.14. The post-opening evaluation team has evaluated traffic data to identify the construction period for the scheme. For the A52 West of Nottingham Corridor Improvements scheme, the construction period was between July 2011 and the 24th May 2012.

5.15. **Table 5.2** summarises the number of accidents reported during the construction period of 11 months.

Table 5.2 – Construction Period Accident Summary

Location	Slight	Serious	Fatal	Total	Rate	Severity Index
Whole Corridor	41	7	0	**48**	52.36	14.6%
QMC Roundabout	8	0	0	**8**	8.73	0.0%
Priory Roundabout	8	1	0	**9**	9.82	11.1%
Wollaton Road Junction	2	1	0	**3**	3.27	33.3%
Thoresby Road Junction	2	1	0	**3**	3.27	33.3%

5.16. During this 11 month period, there were 48 accidents recorded in the area affected by the scheme. This is equivalent to 52.4 per annum. This is higher than the pre-scheme rate of 48 accidents per annum. The severity index of 15% is also higher than the pre-scheme severity index of 13%.

5.17. Of this total, 23 occurred in the vicinity of the four key junctions directly affected by the scheme measures.

Post-Scheme

5.18. To understand the safety performance of the road network after the scheme implementation, data has been collected for the period since the scheme opened. The scheme opened on the 25th May 2012 and data was utilised from 1st June 2012 to as recent a date as possible. For this scheme, data was available until the end of December 2014, meaning that there are 31 months of data to interrogate following the opening of this scheme.

5.19. The accident data is summarised in **Table 5.3** with accident locations shown in **Figure 5.1**.

Table 5.3 – Post-Scheme Accident Summary

Location	Slight	Serious	Fatal	Total	Rate	Severity Index
Whole Corridor	91	13	0	104	40.26	12.5%
QMC Roundabout	19	4	0	24	9.29	16.7%
Priory Roundabout	13	0	0	13	5.03	0.0%
Wollaton Road Junction	11	0	0	11	4.26	0.0%
Thoresby Road Junction	3	2	0	5	1.94	40.0%

5.20. The table demonstrates that there have been 104 personal injury accidents along the full A52 corridor during the 31 month period, with 13 serious accidents and the remainder slight. The post-scheme accident rate is 40.26 and the severity index is 13%.

5.21. Of the individual key junctions, the QMC Roundabout experiences the most accidents with 9.29 per annum.

5.22. Considering the severity of accidents, the data shows that at Priory Roundabout and Wollaton Road Junction there have been no serious or fatal accidents since the scheme opened. The severity index at Thoresby Road Junction is high with 40.0% of accidents being serious.

Accident Rate Change

5.23. The key changes in accidents that can result from a scheme are:

- Change in the frequency of accidents; and
- Change in the severity of accidents.

5.24. By understanding the impact the scheme has had on these metrics, it is possible to draw conclusions on the safety aspects of the scheme.

5.25. **Table 5.4** shows the accident rate and severity index for the pre-construction and post-scheme periods.

Table 5.4 – Impact of Scheme on Accident Rates

Location	5yr Pre-Construction Period		Post-Scheme Period		Accident Saving
	Accident Rate	Severity Index	Accident Rate	Severity Index	
Whole Corridor	48.00	12.5%	40.26	12.5%	**-7.74**
QMC Roundabout	13.00	12.3%	9.29	16.7%	**-3.71**
Priory Roundabout	7.80	7.7%	5.03	0.0%	**-2.77**
Wollaton Road Junction	4.60	4.3%	4.26	0.0%	**-0.34**
Thoresby Road Junction	5.00	20.0%	1.94	40.0%	**-3.06**

5.26. **Table 5.4** indicates the scheme has had a beneficial impact across the A52 corridor with a reduction in the annual accident rate from 48.00 to 40.26, which is a reduction of 7.74 accidents per year. This is substantially greater than the forecast saving of 2.46 accidents per annum which was stated in the PAR.

5.27. At the corridor level, the severity index has remained consistent with 12.5% of accidents being of serious severity. There were no fatal incidents within the corridor either before or after the scheme.

5.28. Considering the impacts at each individual junction, the largest improvement has been at the QMC Roundabout where 3.71 accidents have been saved per annum. The signalisation of this junction is likely to have been a key reason for this improvement with fewer vehicle conflicts now possible as a result of the signal controls. There have also been clear safety benefits at Priory Roundabout and at Thoresby Road Junction with a reduction in annual accident rate of 2.77 and 3.06 respectively. A saving is observed at Wollaton Road Junction however it is of a much smaller scale (0.34 reduction per annum).

5.29. In terms of accident severity, there are different impacts at different locations within the corridor. At QMC Roundabout and Thoresby Road Junction, the post-scheme data indicates an increase in the proportion of serious accidents. This impact is however driven by the reduction in the numbers of slight accidents as the actual frequency of serious accidents has not increased.

5.30. In the case of Thoresby Road Junction there were 5 pre-scheme serious accidents (1.00 per annum) compared to 2 in the post-scheme period (0.77 per annum). There is therefore evidence that as well as a general reduction in accidents, the frequency of serious accidents has also decreased. At QMC Roundabout the frequency of serious accidents is shown to be of a similar level before and after the scheme with 8 accidents occurring pre-scheme (1.60 per annum) comparing to 4 accidents in the post-scheme period (1.55 per annum). The increase in severity index is therefore again not a reflection of more frequent serious accidents occurring.

5.31. At Priory Roundabout and the Wollaton Road Junction there have been no serious or fatal accidents since the completion of the scheme resulting in a severity index of 0%. This is a notable positive outcome.

Accident Causation across the Corridor

5.32. STATS19 accident data provides a comprehensive record of the accidents that have occurred. This allows us to go beyond the frequency and severity of accidents and consider the reasons why accidents have been occurring. It is possible to consider the scheme's impact on both the vehicle movements which lead to accidents, and the contributory factors recorded during accidents.

5.33. **Table 5.5** identifies changes to the factors which have contributed to accidents before and after the implementation of the scheme. All figures presented are accidents per annum. In the outturn column of this table, accidents savings are highlighted in green, while increases are highlighted in red.

Table 5.5 – Impact on Accident Contributory Factors (Whole A52 Corridor)

Contributory Factors	5 Year Pre Construction	Outturn
Failed to look properly	17.40	15.87
Failed to judge other person's speed	13.00	12.77
Sudden Braking	5.80	6.58
Careless/Reckless/In a hurry	5.40	2.32
Poor turn or manoeuvre	5.20	7.74
Following too close	4.40	6.19
Slippery road (due to weather)	3.80	2.32
Loss of control	3.80	2.32
Impaired by alcohol	2.80	0.00
Ped - Failed to look properly	2.60	1.16
Junction restart	2.60	0.77
Disobeyed automatic traffic signal	2.00	2.71
Junction overshoot	1.80	0.77
Inexperienced/learner driver	1.80	0.77

5.34. **Table 5.5** identifies that drivers 'failing to look properly' was the primary cause of accidents before the scheme, resulting in 17.40 accidents per annum before the scheme. The data indicates that these types of accidents have reduced slightly in the post-scheme period with 1.53 fewer accidents per annum in the post-scheme period. Drivers 'failing to judge other people's speed' was the second most common contributory factor, accounting for 13 accidents per annum before the scheme. There has been virtually no change in these types of accidents in the post-scheme period.

5.35. The largest accident savings have been with accidents caused by 'careless or reckless driving' (3.08 reduction per annum) and incidents where a driver was 'impaired by alcohol' (2.80 reduction per annum). Accidents caused by a 'junction restart' have also decreased.

5.36. There have also been some accident causation factors which are more common after the completion of the scheme. The data shows that accidents occurring due to 'poor turns or manoeuvres' and 'following too close' have both increased notably. There has also been a slight increase in accidents caused by vehicles 'travelling too fast for the conditions'.

5.37. **Table 5.6** presents the vehicle movements recorded with accidents before and after the scheme. All figures presented are accidents per annum. In the outturn column, savings above 0.2 accidents per annum are highlighted in green, increases above 0.2 accidents per annum are highlighted in red, while changes of 0.2 accidents per annum or less are highlighted in amber.

Table 5.6 – Impact on Vehicle Movements leading to Accidents (Whole A52 Corridor)

Vehicle Movements	5 Year Pre Construction	Outturn
Going ahead other	41.20	31.74
Waiting to go ahead but held up	12.80	10.84
Moving off	6.20	3.87
Turning left	6.20	3.48
Slowing or stopping	5.60	11.23
Turning right	5.20	7.74

5.38. **Table 5.6** show that most accidents in the corridor affect vehicles as they are travelling ahead (shown in the table as 'going ahead other'). However the scheme appears to have had a positive impact with a reduction of 9.46 per annum within this category.

5.39. Accidents with vehicles 'waiting to go ahead but held up' is the next most common description. This categorisation is typical of the congested conditions experienced within the A52 corridor. The data shows a reduction of 1.96 per annum.

5.40. Before and after the scheme, there has been an increase in accidents involving certain vehicle movements. The largest increase has been where a vehicle is 'slowing or stopping'. The number of vehicles involved in accidents whilst making this movement has increased by 5.63 per annum, which may be a reflection on the new traffic signal controls at two of the junctions within in the corridor.

Accident Causation at Junctions

5.41. Contributory factor information has also been assessed at each of the four key junctions affected by the scheme measures to identify if there have been any discernible changes in trend.

5.42. A list of the most commonly observed contributory factors across the four junctions, as well as the before and after annual accident rates is presented in **Table 5.7**. The paragraphs below provide a summary overview by junction.

5.43. At the QMC Roundabout, 'failed to look properly', 'failed to judge other person's speed', 'sudden braking' and 'failed to look properly' were the most commonly recorded contributory factors, at 1 each per annum. The annual rates of these contributory factors have all decreased post-scheme.

5.44. At Priory Roundabout, 'failed to look properly' was the most commonly recorded contributory factor pre-scheme and the annual rate of this factor has increased post-scheme, despite there being a decrease in annual accident rate at this junction.

5.45. At Wollaton Road Junction, the most commonly recorded contributory factors pre-scheme were 'failed to look properly' and 'failed to judge other person's

speed', both recorded 3.4 times per annum. These reduced considerably to 0.8 and 1.5 respectively post-scheme.

5.46. At Thoresby Road, 'failed to look properly' and 'failed to judge other person's speed' were again the most commonly recorded contributory factors pre-scheme, by a considerable margin. These were recorded 3.0 and 2.8 times per annum pre-scheme. Post-scheme, there has been an increase in recorded instances of 'failed to look properly', but a decrease in 'failed to judge other person's speed.

Table 5.7 – Impact on Vehicle Movements leading to Accidents (Key Junctions)

Vehicle Movements	QMC Roundabout			Priory Roundabout			Wollaton Road Jct			Thoresby Road Jct		
	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
Failed to look properly	1.0	0.4	**-0.6**	1.6	2.3	**0.7**	3.4	0.8	**-2.6**	3.0	4.3	**1.3**
Failed to judge other person's speed	1.0	0.0	**-1.0**	1.0	1.9	**0.9**	3.4	1.5	**-1.9**	2.8	1.9	**-0.9**
Poor turn or manoeuvre	0.8	0.0	**-0.8**	0.2	1.2	**1.0**	1.6	0.8	**-0.8**	1.0	1.5	**0.5**
Following too close	0.4	0.8	**0.4**	0.4	0.4	**0.0**	0.8	1.2	**0.4**	2.0	1.2	**-0.8**
Sudden Braking	1.0	0.4	**-0.6**	1.0	1.2	**0.2**	0.6	1.5	**0.9**	1.0	1.2	**0.2**
Swerved	0.2	0.0	**-0.2**	0.4	0.0	**-0.4**	0.4	0.4	**0.0**	0.2	1.2	**1.0**
Cyclist entering road from pavement	0.4	0.0	**-0.4**	0.0	0.0	**0.0**	0.0	0.0	**0.0**	0.6	0.8	**0.2**
Pedestrian - Wrong use of crossing	0.0	0.4	**0.4**	0.2	0.0	**-0.2**	0.0	0.0	**0.0**	0.0	0.8	**0.8**
Loss of control	1.0	0.0	**-1.0**	0.4	0.0	**-0.4**	0.6	0.4	**-0.2**	1.0	0.4	**-0.6**
Careless/Reckless/In a hurry	0.8	0.0	**-0.8**	1.0	0.0	**-1.0**	0.8	0.8	**0.0**	0.8	0.4	**-0.4**
Slippery road (due to weather)	0.6	0.4	**-0.2**	0.4	0.4	**0.0**	0.2	0.0	**-0.2**	0.8	0.4	**-0.4**
Junction restart	0.0	0.0	**0.0**	0.0	0.0	**0.0**	1.2	0.0	**-1.2**	0.6	0.4	**-0.2**
Pedestrian - Failed to look properly	0.4	0.4	**0.0**	0.2	0.0	**-0.2**	0.4	0.0	**-0.4**	0.6	0.4	**-0.2**
Failed to signal/misleading signal	0.0	0.0	**0.0**	0.0	0.4	**0.4**	0.4	0.0	**-0.4**	0.4	0.4	**0.0**
Disobeyed automatic traffic signal	0.0	0.0	**0.0**	0.6	0.0	**-0.6**	0.0	0.8	**0.8**	0.0	0.4	**0.4**
Exceeding speed limit	0.4	0.0	**-0.4**	0.2	0.0	**-0.2**	0.0	0.8	**0.8**	0.2	0.0	**-0.2**
Inexperienced/learner driver	0.2	0.4	**0.2**	0.4	0.4	**0.0**	0.4	0.0	**-0.4**	0.2	0.0	**-0.2**

Summary

- The whole A52 West of Nottingham Corridor area had 240 recorded accidents during a five year pre-construction period including 30 serious accidents. There were no fatal accidents. This is equivalent to 48.0 accidents per annum with a severity index of 12.5%;
- During construction, 48 accidents were recorded, equivalent to an annual accident rate of 52.4. This is higher than the pre-scheme period. The severity index was also slightly higher during construction (14.6% compared to 12.5%) with 7 serious accidents during the 11 month works period;
- Across a 31 month post-scheme period, there were 104 accidents recorded within the corridor, of which 13 were serious and 0 were fatal. The annual accident rate was therefore 40.3, with a severity index of 12.5%;
- **Across the corridor, there was therefore an observed saving of 7.74 accidents per annum meaning the scheme has had a beneficial impact on reducing accidents. The overall severity ratio is unchanged as a result of the scheme, but the absolute rate of serious or fatal accidents is now lower;**
- Considering accident impacts close to the key individual junctions within the corridor, the highest pre-scheme annual accident rate was observed around the QMC Roundabout where 13.0 accidents were recorded per annum. This reduced to 9.29 in the post-scheme period with a saving of 3.71 per annum. The severity index increased slightly from 12.3% to 16.7% although the frequency of serious accidents was very similar before and after the scheme;
- At the Priory Roundabout there has been a reduction in accidents from 7.80 per annum before the scheme to 5.03 per annum afterwards. The severity index was reduced from 7.7% to 0.0% with no serious or fatal incidents since the scheme opened;
- At the Wollaton Road Junction there was a slight saving in annual accidents with a pre-scheme rate of 4.60 and a post-scheme rate of 4.26. There have also been no serious or fatal accidents to occur since the scheme opened, meaning a reduction in the severity index from 4.3% pre-scheme to 0.0% for the post-scheme period;
- At the Thoresby Road Junction there was a saving of over 3 accidents per year observed, with the annual accident rate reducing from 5.00 to 1.94. The severity index doubled from 20% to 40% although this is reflects the lower numbers of slight accidents. The actual frequency of serious accidents is found to be lower after the scheme than before; and
- Analysis of contributory factors has shown that ‘failure to look properly’ and a ‘failure to judge another person’s speed’ are the two most common reasons for accidents within the A52 corridor. Both of these causation factors have decreased slightly following the opening of the scheme but they remain the most common factors for incidents. The largest reduction was in accidents where a driver acts ‘carelessly, recklessly or in a hurry’; this type of accident has reduced by 3.08 accidents per annum. The largest increase is where drivers make ‘poor manoeuvres’.

6. Economy

Introduction

6.1. This section of the report takes the journey time and safety impacts reported in sections 4 and 5, and considers the monetary value of these impacts. These monetised benefits are then compared to the cost of scheme construction to inform two measures of value for money:

- **First Year Rate of Return (FYRR):** This is a measure of the scheme's first year benefits as a proportion of the scheme cost. It is given as a percentage and informs the percentage of the scheme costs recouped in the opening year. The FYRR given is evidence based and a primary finding of this report; and
- **Benefit Cost Ratio (BCR):** This is a measure of all the benefits that the scheme is likely to accrue over its workable life divided by the scheme cost over its life. This can only be a prediction, as this is a one year after opening report and it is not known how the scheme will perform in the future. However, this forecast is revised from that provided in the PAR based on the first year evidence.

6.2. All monetised figures in this section are quoted in 2002 prices, discounted to opening year, unless otherwise specified.

PAR and Outturn Comparison

6.3. The evidence provided in this report has been analysed to evaluate the scheme costs and economic benefits of the scheme provided in the PAR and to calculate the outturn costs and scheme benefits.

6.4. The benefits calculated and discussed in this report can be monetised using standard value of time and accident values from WebTAG. A positive impact is considered to provide a monetary saving. Once monetised in this way, the economy and safety impacts of the scheme are offset against the scheme costs to inform the overall Value for Money of the scheme package in both an opening year, and over a longer scheme life period of 60 years.

6.5. **Table 6.1** summarises this comparison, presenting the PAR and Outturn costs and benefits of the scheme. It also includes opening year and scheme life figures for both costs and benefits of the scheme.

Table 6.1 – PAR and Outturn Economy Comparison

		PAR	Outturn
Opening Year (2012)	Total Cost	£2,945,139	£3,153,639
	Opening Year Accident Saving (number)	2.46	7.74
	Opening Year Accident Saving (£)	£184,771	£581,497
	Opening Year Journey Time Benefits (£)	£6,291,285	-£3,785,675
	FYRR	220%	-102%
Scheme Life (60 years)	Costs	£2,945,139	£3,154,639
	Safety Benefits	£9,073,530	£28,555,564
	Journey Time Benefits	£248,835,199	-£149,732,390
	BCR	87.6	-38.4

Summary

6.6. Overall the scheme is shown to have been considerably less successful than was predicted and has failed to deliver an overall beneficial impact.

6.7. It was anticipated that the scheme would deliver a large journey time saving, as well as preventing some of the accidents that were occurring along the corridor and at the four major junctions upgraded as part of the works. The proportional benefits were proposed to be 96% due to economy impacts and 4% for safety impacts.

6.8. The Sat Nav data has provided evidence that journey times have in fact increased for many movements and in many time periods since the opening of the scheme. Whilst there are some noted minor benefits on specific arms during some time periods, there is an overall journey time dis-benefit of -£3.79m per annum, once these impacts are annualised.

6.9. The scheme has however saved considerably more accidents than forecast and this large accident saving has partly compensated for the journey time increases. Whilst it was anticipated that 2.46 accidents per annum would be saved, the actual saving has been 7.74 accidents per annum. As a result, the monetary safety benefits are more than triple those predicted, equal to £0.581m per annum once monetised.

6.10. The outturn scheme costs were also slightly higher than those predicted in the PAR evaluation; with an observed increase in spend of £208,500.

6.11. As the predicted journey times did not materialise, and despite the tripling in accident reduction, the Value for Money is heavily affected. The outturn FYRR

and BCR are significantly impacted. The PAR predicted FYRR was 220% whereas the actual values show a FYRR of -102%.

6.12. Given the scheme life 60 year benefits are calculated on the basis of the FYRR, the outturn BCR of -38.4 shows a very negative outcome for the scheme, particularly noting the proposed BCR was 87.6 in the PAR.

6.13. As however previously discussed, a number of schemes (tram and highway) have caused significant disruption to the area.

7. Other Impacts

7.1. This section of the report presents information relating to the WebTAG objectives which are not related to journey times, reliability or safety, as set out in the PAR's AST (as these have already been discussed in previous chapters).

7.2. This information will be compared to the forecasts made in the AST (provided in **Appendix D**). These comparisons are used to score the scheme against objectives based on the first year's observed findings and are recorded in the Evaluation Summary Table (EST). The EST can be found in **Appendix E**.

7.3. Those impacts which are not detailed below have all been assessed as neutral.

Townscape

7.4. The scheme's PAR did not consider that the scheme would have any impact on townscape.

7.5. The post-opening evaluation scores townscape as **slight adverse**, as a result of the impact which installing additional traffic signalling equipment has had at both Priory and QMC roundabouts.

Journey Ambience

7.6. The scheme predicted a benefit to journey ambience from reduced stress levels caused by improved journey time.

7.7. This has been scored as adverse in the post-opening assessment given there were no observed reductions in journey times and these dis-benefits were shown to significantly outweigh the observed safety impacts.

Severance

7.8. The scheme's PAR did not consider that the scheme would have any impact on severance.

7.9. Community severance is defined as "the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes. Severance will only be an issue where either vehicle flows are significant enough to significantly impede pedestrian movement or where infrastructure presents a physical barrier to movement".

7.10. The A52 West of Nottingham corridor scheme has introduced new traffic signals which include controlled crossing provisions for pedestrians and cyclists. Notably, with the full signalisation of the Priory Roundabout, crossings have been introduced on all arms of the roundabout. Whilst on site, there was utilisation of the crossings, particularly from local residents to access the petrol station located at this junction.

7.11. As a result the severance impact can be considered to have improved, with a slight beneficial impact.

Access to the Transport System

7.12. The scheme's PAR did not consider that the scheme would have any impact on access to the transport system.

7.13. Although the scheme has introduced NMU measures to make it easier for people to safely walk to bus stops, there is not enough of an impact on accessibility to public transport and so the impact is assessed as neutral.

Noise

7.14. The scheme's PAR did not consider that the scheme would have any impact on noise.

7.15. In line with the agreed methodology for POPE of LNMS, a desktop review has been completed of the location which indicates that there are homes within 300m of the scheme. An assessment for noise is therefore appropriate. Any changes in traffic volumes, HGV proportions and vehicle speeds are used to identify if there has been a noise impact significant enough to be reported in the EST. PAR5 guidance suggested that impacts are only significant if:

- Traffic volume changes by more than 25%; or
- The HGV proportion changes by more than 20%; or
- Vehicle speeds change by more than 10kph.

7.16. The traffic profile analysis presented earlier in this report has been revisited, to look at the ADT and HGV ADT for the 12 months prior to and 12 months since the scheme construction. These figures are shown in the table below supported by the percentage change.

Table 7-1 – Noise Impact

	AADT 2-way	HGV AADT 2-way	Speeds
12 month* prior to construction (Oct 2009 – Sep 2010) * 6 months for speed data – June 2010 to Dec 2010	39,404	2,413	The greatest speed difference is observed on the QMC Roundabout where on a Sunday the average speed dropped from 34.18kph to 25.53kph.
12 month* post construction (Apr 2014 – Mar 2015) * 6 months for speed data – June 2012 to Dec 2012	41,055	2,844	
Change	1,651 (4.2%)	431 (17.8%)	-8.65kph

7.17. The table demonstrates that all traffic flow has changed by around 4.2%, and the HGV flow has increased by 17.8% (yet still below the 20% threshold to record significant noise impact). Further, while speeds have changed in certain time periods and routes, the maximum change in speed was an 8.65kph reduction on a Sunday. As such, there is no evidence that noise will have significantly changed at the site, and so the outturn assessment of noise is scored neutral.

Local Air Quality

7.18. The scheme's PAR did not consider that the scheme would have any impact on local air quality.

7.19. In line with the agreed methodology for POPE of LNMS, a desktop review has been competed of the location which indicates that there are homes within 50m of the scheme. An assessment for local air quality is therefore required, based on change in AADT and vehicle speeds. PAR5 guidance suggested that local air quality impacts are only significant if the AADT has changed by more than 700 vehicles or the vehicle speeds changed by >5kph. The traffic change also needs to be at least 10% higher or lower than the pre-scheme volume to be significant.

7.20. The traffic volume analysis in Chapter 3 and shown in Table 7.1 shows that traffic volumes travelling along the A52 have changed by less than 10%. Based on the lack of change in traffic volumes, it is considered that the changes in air quality are not significant and the EST therefore includes a neutral impact for local air quality.

8. Conclusions and Recommendations

8.1. This report presents the POPE of the A52 West of Nottingham Corridor LNMS, implemented by Area 7. The scheme evaluation has considered all elements of the WebTAG criteria.

8.2. 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.

8.3. The A52 West of Nottingham Corridor LNMS opened in May 2012. The scheme introduced a number of improvements to the corridor – focusing on 4 key junctions, with the introduction of MOVA at two previously signalised junctions, and the full signalisation of two roundabouts.

8.4. The journey time analysis identified that the scheme has failed to contribute to the journey time improvements that were predicted following scheme completion. However, it is recognised that the construction of a number of schemes local to the area including the A453 upgrade and the Nottingham tram works particularly on the parallel A6005 University Boulevard have had significant impacts to journey time reliability in the area as a whole.

8.5. The scheme has however delivered significant safety benefits beyond what was predicted prior to scheme implementation. Furthermore, the full signalisation of the QMC and notably the Priory Roundabouts have brought significant positive impacts to non-motorised users with reduced severance.

Scheme Specific Objectives

8.6. 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	Evaluation Summary	
Economy: Reducing congestion and improving reliability	The scheme has resulted in an increase in journey times with an additional 282,092 vehicle hours in the opening year. Sat nav data also suggests that the reliability of journeys has decreased.	✗
Safety: Reducing accidents	The scheme has had a significant impact in reducing accidents, with the annual accident rate falling from 48 in the five year pre-construction period to 40.26 after the introduction of the scheme.	✓

Lessons Learned

8.7. The stakeholder feedback suggests that during PAR development the consultation carried out was predominantly with Nottingham City Council, with

limited involvement from the County Council despite most of the A52 corridor located in the County boundary. As such, it is important that in future appraisal all relevant local authorities are consulted.

Appendices

Appendix A. Pre-Scheme Journey Times

A.1. A52 Mainline Sections

Segment	Distance (m)	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
Westbound								
QMC R/abt to Priory R/abt	1238.2	98.3	166.7	139.5	93.6	77.8	100.3	93.4
Priory R/abt to Wollaston Rd	558.3	75.1	66.9	63.5	60.7	43.8	59.6	53.0
Wollaston Rd to Thoresby Rd	1004.2	70.2	71.4	71.0	69.8	65.0	72.1	69.3
Thoresby Rd to A6007 Jct	606.8	50.6	52.6	50.2	46.0	41.1	45.5	44.6
Eastbound								
A6007 Jct to Thorsby Rd	696.3	147.3	68.6	71.2	72.9	54.8	67.8	61.9
Thoresby Rd to Wollaton Rd	1002.9	124.1	72.6	74.1	77.7	65.3	73.5	73.5
Wollaton Rd to Priory R/abt	100.3	16.3	7.0	7.4	8.5	7.8	8.2	8.5
Priory R/abt to QMC R/abt	1128.5	154.8	98.4	92.6	96.6	69.8	100.5	82.1

A.2. QMC Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A6002)	South	71.3	133.7	71.8	67.3	43.7	51.8	49.9
	West	81.5	175.3	93.6	77.4	52.3	64.8	60.7
	North	81.6	154.3	85.2	77.7	54.0	62.8	60.6
South (A52)	West	60.1	241.5	109.7	62.8	50.8	60.1	58.8
	North	60.2	220.6	101.3	63.0	52.5	58.1	58.7
	East	75.1	232.7	113.4	75.4	61.0	68.5	68.2
North (A6514)	East	78.3	59.2	54.2	59.9	41.5	48.7	46.9
	South	82.2	64.8	59.3	65.3	46.7	53.5	52.2
	West	92.4	106.3	81.1	75.3	55.3	66.5	62.9
West (A52)	North	95.8	70.5	68.5	70.5	55.0	64.1	60.6
	East	110.7	82.5	80.6	82.9	63.6	74.4	70.1
	South	114.6	88.2	85.7	88.3	68.9	79.3	75.4

A.3. Priory Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A52)	South	74.2	64.1	59.9	56.8	46.4	59.1	56.4
	West	82.6	74.8	68.9	64.6	56.6	65.8	62.5
	North	85.8	76.6	71.5	68.5	64.1	68.6	65.8
South (A6464)	West	63.0	110.0	91.3	65.7	64.2	72.3	71.9
	North	66.2	111.8	94.0	69.5	71.6	75.0	75.2
	East	87.9	122.5	102.9	79.1	77.8	84.6	83.2
North (Wollaton Vale)	East	192.3	62.3	59.4	76.2	54.4	69.0	61.4
	South	195.2	71.0	68.6	85.0	65.0	80.7	74.9
	West	203.7	81.7	77.6	92.8	75.2	87.3	80.9
West (A52)	North	129.4	64.5	56.4	59.4	41.8	57.6	51.5
	East	151.1	75.2	65.3	69.0	47.9	67.1	59.4
	South	154.0	83.9	74.5	77.9	58.5	78.8	72.8

Appendix B. Post-Scheme Journey Times

B.1. A52 Mainline Sections

Segment	Distance (m)	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
Westbound								
QMC R/abt to Priory R/abt	1238.2	118.6	199.0	174.8	98.2	77.2	114.4	97.9
Priory R/abt to Wollaston Rd	558.3	60.5	64.0	61.9	57.8	51.8	55.8	51.8
Wollaston Rd to Thoresby Rd	1004.2	73.2	80.2	77.5	73.4	67.2	71.8	71.2
Thoresby Rd to A6007 Jct	606.8	51.2	56.9	53.0	47.8	40.6	47.8	46.0
Eastbound								
A6007 Jct to Thorsby Rd	696.3	130.7	68.1	71.5	68.4	53.5	70.8	59.9
Thoresby Rd to Wollaton Rd	1002.9	176.1	83.3	77.1	85.3	67.0	91.1	73.3
Wollaton Rd to Priory R/abt	100.3	22.8	8.6	8.3	9.3	9.1	10.4	8.5
Priory R/abt to QMC R/abt	1128.5	165.3	117.0	103.1	104.6	70.0	107.2	85.5

B.2. QMC Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A6002)	South	69.3	145.7	85.5	70.2	56.4	66.8	64.8
	West	82.4	196.6	114.8	83.1	66.6	81.9	77.4
	North	83.5	176.8	105.9	85.3	70.9	81.5	78.8
South (A52)	West	77.2	299.6	159.0	76.2	60.2	76.3	68.1
	North	78.3	279.8	150.1	78.3	64.5	75.9	69.5
	East	92.3	292.2	163.2	91.9	75.6	88.3	81.8
North (A6514)	East	80.0	89.7	83.4	83.3	56.9	69.0	67.7
	South	85.1	95.4	89.1	88.6	63.0	74.5	73.7
	West	98.1	146.3	118.4	101.5	73.2	89.6	86.3
West (A52)	North	101.8	86.7	83.0	87.4	67.7	84.2	77.0
	East	115.8	99.0	96.1	101.0	78.8	96.6	89.3
	South	120.9	104.8	101.7	106.3	85.0	102.1	95.3

B.3. Priory Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A52)	South	99.4	84.9	79.4	73.0	56.1	74.9	69.0
	West	106.7	91.1	86.9	80.3	64.7	80.1	75.0
	North	115.8	96.1	90.8	86.3	72.6	85.0	82.4
South (A6464)	West	84.5	88.7	92.5	75.4	73.2	85.9	80.9
	North	93.5	93.7	96.3	81.4	81.2	90.8	88.3
	East	119.1	104.7	105.3	91.2	88.0	100.7	96.3
North (Wollaton Vale)	East	244.3	83.2	78.7	90.3	66.6	82.3	72.8
	South	247.1	95.6	90.1	101.8	80.1	96.9	87.7
	West	254.5	101.8	97.6	109.1	88.7	102.1	93.7
West (A52)	North	193.0	90.7	62.1	74.1	49.9	80.9	61.9
	East	218.6	101.7	71.0	83.9	56.7	90.8	69.9
	South	221.5	114.1	82.4	95.4	70.3	105.4	84.8

Appendix C. Annual Vehicle Hour Changes

C.1. A52 Mainline Sections

Segment	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
Westbound							
QMC R/abt to Priory R/abt	3,416	9,578	3,450	2,659	-222	2,544	689
Priory R/abt to Wollaston Rd	-2,594	-1,075	-191	-1,670	2,916	-680	-234
Wollaston Rd to Thoresby Rd	609	4,017	923	2,406	915	-61	451
Thoresby Rd to A6007 Jct	171	1,552	323	1,729	-321	678	272
Eastbound							
A6007 Jct to Thorsby Rd	-4,044	-259	53	-3,470	-636	709	-523
Thoresby Rd to Wollaton Rd	15,951	3,417	320	7,228	985	5,232	-41
Wollaton Rd to Priory R/abt	1,736	465	95	706	681	552	-0
Priory R/abt to QMC R/abt	2,130	4,992	881	4,829	74	1,245	522

C.2. QMC Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A6002)	South	-80	579	251	338	937	548	456
	West	51	2527	781	1192	1834	1091	892
	North	25	588	193	303	414	226	185
South (A52)	West	1597	7734	2204	3861	1679	1428	688
	North	106	1101	338	531	259	188	96
	East	1077	3874	1139	2701	1474	993	570
North (A6514)	East	11	409	131	1819	744	487	416
	South	76	967	328	1708	742	472	405
	West	193	1766	494	2546	1077	689	581
West (A52)	North	68	403	122	915	427	335	228
	East	288	1397	421	3203	1670	1207	872
	South	756	2317	638	5321	2953	2064	1507

C.3. Priory Roundabout Sections

Arm From	Arm To	AM Peak	PM Peak	PM Shoulder	Inter Peak	O/night	Sat Daytime	Sun Daytime
East (A52)	South	261	623	187	675	254	205	208
	West	2832	3781	1478	5365	1727	1517	1764
	North	737	672	146	1252	375	359	217
South (A6464)	West	1165	-2616	49	2244	1303	971	620
	North	1777	-2258	82	3073	1538	1265	777
	East	643	-588	21	1013	534	418	193
North (Wollaton Vale)	East	3476	1644	490	2648	1424	776	497
	South	4873	2048	484	3488	1971	1049	498
	West	477	205	51	266	138	75	56
West (A52)	North	519	550	22	314	109	155	70
	East	12038	5377	435	7191	2669	3555	1377
	South	5251	2327	195	5131	2168	2418	509

Appendix D. Appraisal Summary Table (AST)

	Sub-Objective	Qualitative Impact	Quantitative Measures	Assessment
ENVIRONMENT	Noise	Not applicable	Not applicable	Not applicable
	Local Air Quality	Not applicable	Not applicable	Not applicable
	Greenhouse Gases	Not applicable	Not applicable	Not applicable
	Landscape	Not applicable		Not applicable
	Townscape	Not applicable		Not applicable
	Heritage and Historical Resources	Not applicable		Not applicable
	Biodiversity	Not applicable		Not applicable
	Water Environment	Not applicable		Not applicable
	Physical Fitness	Not applicable	Not applicable	Not applicable
	Journey Ambience	- Benefits against Frustration; Improvement towards being able to make better progress along the route due to reduced delay and ability to drive closer to speeds consistent with driver's wishes. - The Assessment Score is based on the fact that some more than 500 but less than 10,000 drivers will benefit from the proposed improvements during the peak operating periods whilst travelling eastbound along the A52(T) corridor between Bramcote and QMC roundabouts.		Slight beneficial
SAFETY	Accidents	-	126 accidents saved	£6.658m Accident PVB
	Security	Not applicable	Not applicable	Not applicable
ECONOMY	Public Accounts	-	-	£2.161m
	All Users	Delays during construction beleived to be negligible	Journey Time Delay Caluclations are outlined in the A52(T) Bardills to Dunkirk Study undertaken by AMScott (May 2008)	£182,578.092m All Users+Providers PVB £0.000m Incident Delay PVB £182,578.092m Combined PVB
	Reliability	Not applicable	Not applicable	Not applicable
	Wider Economic Impacts	Not applicable	Not applicable	Not applicable
ACCESSIBILITY	Option values	Not applicable		Not applicable
	Severance	Not applicable	Not applicable	Not applicable
	Access to Transport System	Not applicable		Not applicable
INTEGRATION	Transport Interchange	Not applicable	Not applicable	Not applicable
	Land Use Policy	Not applicable		Not applicable
	Other Government Policies	Not applicable		Not applicable

Appendix E. Evaluation Summary Table (EST)

	Sub-Objective	Qualitative Impact	Quantitative Measures	Assessment
ENVIRONMENT	Noise	Not applicable	Traffic volume change 4.2%; HGV propotion 17.8%; Vehicle speeds - 8.65kph therefore neutral impact	Neutral
	Local Air Quality	Not applicable	Traffic volume change 4.2% therefore neutral impact	Neutral
	Greenhouse Gases	Not applicable	Not applicable	Not applicable
	Landscape	Not applicable	-	Not applicable
	Townscape	Additional signals contribute to negative impacts on visual landscape - scheme located in the urban environment	-	Slight adverse
	Heritage and Historical Resources	Not applicable	-	Not applicable
	Biodiversity	Not applicable	-	Not applicable
	Water Environment	Not applicable	-	Not applicable
	Physical Fitness	Not applicable	Not applicable	Not applicable
	Journey Ambience	Adverse impact given increase in delay, w hich outw eighs observed safety benefits	-	Adverse
SAFETY	Accidents	-	398 accidents saved over 60 year scheme life	Large beneficial
	Security	Not applicable	Not applicable	Not applicable
ECONOMY	Public Accounts	-	-	Adverse
	All Users	Negative impact to journey times	£149m journey time dis-benefit	Adverse
	Reliability	Weekday journey times are less reliable follow ing completion of the scheme. An exception in the AM w here the ranges of percentile journey times is similar before and after the scheme. Reliability in the PM peak and PM shoulder period are negatively impacted, as are w eekend journey times	Not applicable	Large adverse
	Wider Economic Impacts	Not applicable	Not applicable	Not applicable
ACCESSIBILITY	Option values	Not applicable	-	Not applicable
	Severance	Some improvement w ith introduction of new crossings at Priory Rbt	Not applicable	Slight beneficial
	Access to Transport System	Other than severance benefits, no impact on access to the public transport system	-	Neutral
INTEGRATION	Transport Interchange	Not applicable	Not applicable	Not applicable
	Land Use Policy	Not applicable	-	Not applicable
	Other Government Policies	Not applicable	-	Not applicable

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