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Mansfield District Transport Study

Stage 2: Local Plan Growth

January 2015

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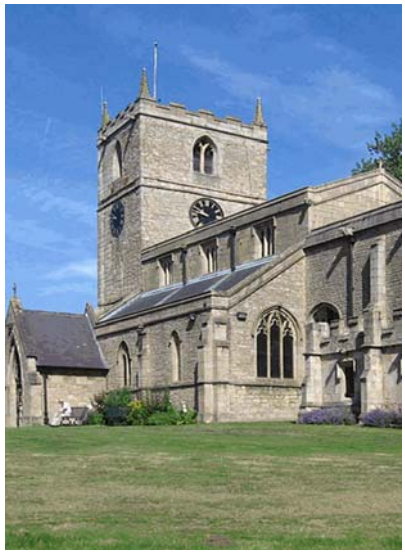
Prepared for:
Mansfield District Council

UNITED KINGDOM & IRELAND



REVISION SCHEDULE					
Rev	**Date**	**Details**	**Prepared by**	**Reviewed by**	**Approved by**
1	28 Mar 2014	First Draft	L Kennedy	A Hall	D Elliott
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The methodology adopted and the sources of information used by URS in providing its services are outlined in this Report. The work described in this Report was undertaken between **May 2012** and **January 2015** and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances.

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EXECUTIVE SUMMARY

Overview

Mansfield District Council is currently preparing a new local development plan to be known as the Mansfield District Local Plan. It will comprise two main parts. Part 1 will provide the overall planning strategy for the area through strategic policies dealing with the overall scale, broad distribution and timing of new development. Part 2 will take forward the strategy with policies that allocate land for development and designate specific areas for protection.

All development plan documents will be subject to 'Examination in Public'. As such, a wide-ranging evidence base is being prepared to support the new Mansfield District Local Plan. This report considers how the transport network is likely to operate in future (2031) with the potential development plan-related proposals. The operation of the transport network in 2012 and without the potential development plan proposals were presented in the Stage 1 assessment and report.

This report presents Stage 2. It considers the transport network conditions in the future with the identified development sites identified in the Local Plan. A future year of 2031 has been considered as this represents the end of the development plan period.

Although the focus of the assessment work relates to the operation of roads and junctions, this report does consider all modes of transport within the district of Mansfield.

Having examined the Base Year conditions and the forecast traffic conditions in the Stage 1 Report, this part of the study examines the likely future conditions within Mansfield and Market Warsop, given the most likely projections of growth and committed developments (both transport infrastructure and land-use developments) along with Local Plan 'Urban Concentration' growth scenario that has identified possible development opportunities to 2031.

Table 1 below details the hourly trip total represented in the Base Year (2012) SATURN model, the DfT's national growth forecasts (NTEM) to 2031, the 2031 trip totals calculated for the Reference Case (based on committed, 5-year SHLAA and pipeline developments in Mansfield District) and those additionally associated with the identified Local Plan developments (also 2031). The Local Plan growth represents an increase of trips equal to 21% in the AM Peak and 22% in the PM Peak compared to the Baseline.

Table 1: Matrix Totals

Trip demand scenario	Total Trips	
	AM	PM
Base 2012	29,044	30,685
NTEM 2031	34,120	36,282
Reference Case 2031	34,148	36,007
Local Plan 2031	35,282	37,537

The 2031 Local Plan traffic model was interrogated to determine those junctions with a traffic demand to capacity (V/C) ratio of more than 0.85.

This process highlighted the following eight junctions within the Mansfield urban area:

- Chesterfield Road / Debdale Lane;
- A60 Nottingham Road / Berry Hill Lane;
- Carter Lane / Southwell Road / Windsor Road;
- A60 Leeming Lane / New Mill Lane;
- A617 MARR / A6191 Southwell Road;
- A60 Leeming Lane / Peafield Lane;
- A38 Sutton Road / Skegby Lane;
- A60 Leeming Lane / A6075 Warsop Road

The detailed junction modelling of these junctions confirm that seven of the identified junctions would operate either near to or at capacity (Degree of Saturation >90%) or over capacity (Degree of Saturation >100%) with traffic demand forecasts that include sites in 2031 Local Plan. The only exception is A617 MARR / A6191 Southwell Road which would operate within capacity in all cases.

A further junction that would be over-capacity was identified in Market Warsop. This was at:

- A60 Church Street / B6035 Church Street / Wood Street

This traffic signalled junction would be over capacity in the PM Peak by 2031, with the Reference Case forecast traffic levels, and would be over capacity in both the AM and PM Peak hours with Local Plan development sites.

Some form of capacity improvement would be required at seven of the nine junctions, in order to accommodate trips from Local Plan development sites.

An assessment and review of the sustainable travel potential of each Local Plan site has been undertaken to identify sites that may require additional interventions to maximise sustainable travel take up. Sites that can maximise the levels of sustainable travel options, where these are both available and attractive, have the most potential to result in decreased car dependency and result in fewer single occupier car trips being generated. The development of sites with sustainable travel options would reduce the generation of private car trips and assist with the mitigation of a site's traffic impacts.

It is expected that any subsequent planning application for a site would be required to include a transport assessment and travel plan that would identify that site's traffic impacts and detail a package of mitigation measures.

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1 INTRODUCTION

1.1 Overview

1.1.1 Mansfield District Council is currently preparing a new local development plan to be known as the Mansfield District Local Plan. It will comprise two main parts. Part 1 will provide the overall planning strategy for the area through strategic policies dealing with the overall scale, broad distribution and timing of new development. Part 2 will take forward the strategy with policies that allocate land for development and designate specific areas for protection.

1.1.2 The new Local Plan will be subject to 'Examination in Public'. As such, a wide-ranging evidence base is being prepared to support the new Mansfield District Local Plan. This report has been prepared as part of this evidence base, and considers the transport context within which the potential development plan-related development would be brought forward. Although written as a stand-alone report, it should be read alongside the other documents comprising the evidence base as transport is only one consideration informing the new Local Plan and associated development allocations.

1.2 Reporting Structure

1.2.1 The transport assessment work has been undertaken via a 'stepped' approach. Broadly, these steps are:

Step 1:	How does the current transport network operate now?	Stage 1
Step 2:	How is the transport network likely to operate in future, with committed infrastructure schemes and land-use developments, but without the development identified in the development plan?	
Step 3:	How is the transport network likely to operate in future, with committed infrastructure schemes and land-use developments, and with development identified in the development plan?	Stage 2

1.2.2 From the above, comparison of the outputs from Stage 1 and Stage 2 will allow the impact of the proposed development identified in the development plan to be judged and the appropriate level of mitigation identified.

1.2.3 Step 1 and Step 2 are detailed in the Stage 1 report (Mansfield District Transport Study: Stage 1 Baseline and Reference Case, March 2013). The Stage 1 report has been revised (October 2014) so that the Reference Case assessments may be compared with the assessments in this Stage 2 report.

1.3 Purpose of this Report

1.3.1 This report comprises of Step 3. It considers the transport network conditions in the future *with* the identified development sites in the development plan. A future year of 2031 has been considered as this represents the end of the development plan period.

1.3.2 Although the focus of the assessment work relates to the operation of roads and junctions, this report does consider all modes of transport within the district of Mansfield.

1.3.3 The outputs from this Stage 2 assessment can be compared against those presented in the Stage 1 assessment.

1.4 Study Area

1.4.1 The Study Area is shown in Figure 1.1 (at the end of this section) and covers Mansfield, Market Warsop and the surrounding area. This is the same study area as previously identified, assessed and reported at Stage 1.

1.5 Methodology

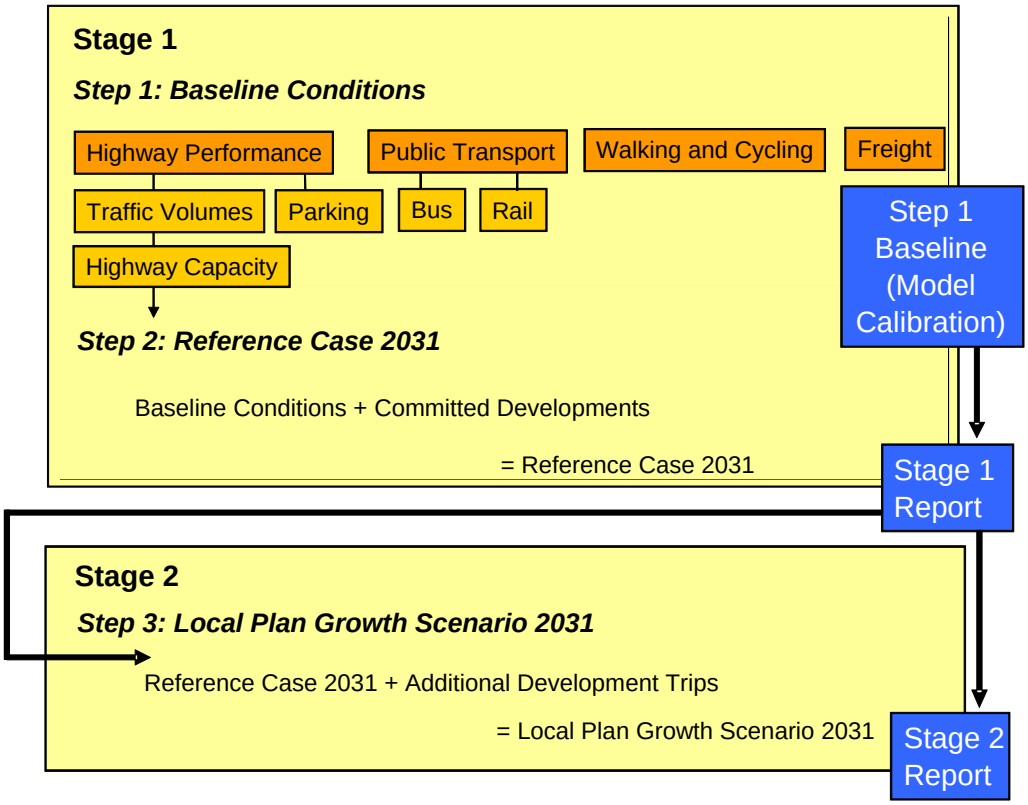
1.5.1 Figure 1.2 summarises the methodology employed for this study. Essentially there are three steps:

Step 1 collates data about the existing transport conditions and identifies a 'Baseline'.

Step 2 examines future conditions given the most likely projections of growth and committed developments (both transport infrastructure and land-use developments) that are likely to be implemented to 2031. This is a 'Reference Case' against which potential additional development can be judged.

Step 3 then examines the likely future conditions given the introduction of potential development plan-related proposals, and reviews this against the 'Reference Case'.

1.5.2 **Figure 1.2:** Study Methodology (Steps 1 – 3)



1.5.3 Data to inform the above steps have been obtained from both Mansfield District Council's planning department, and Nottinghamshire County Council (the local highway authority). In particular, the following information and data has been collated:

- Details of committed land-use developments to 2031;
- Details of committed transport-infrastructure improvements to 2031;
- Details of "urban concentration" land use developments identified by the draft Local Plan;
- Historic traffic count data from Nottinghamshire County Council including:
  - 19 Manual Classified Counts at junctions; and
  - 16 Department for Transport (DfT) passing counts.
- New traffic count data was commissioned for the following junctions during July 2012;
  - A60 / B6035 Church St, Market Warsop;
  - A6075 Peafield Lane / B6035, South of Market Warsop;
  - A60 Leeming Lane North / A6075 Peafield Lane, Market Warsop;
  - A60 Leeming Lane / New Mill Lane (December 2012);
  - A6009 St Peter's Way / A60 Woodhouse Road / B6033 Bath Lane;
  - A6009 St Peter's Way / A6191 Ratcliffe Gate / Bridge Street;
  - A6191 Rock Hill / Southwell Road West / Windsor Road / Carter Lane;
  - A6009 St Peter's Way / A60 Nottingham Road / Albert Street;
  - A60 Portland Street / A6009 St Peter's Way / Portland Retail Park.
- Cycle count data from Nottinghamshire County Council;
- Road Safety statistics from Nottinghamshire County Council;
- Census data from National Statistics; and
- Mansfield SATURN traffic model.

1.5.4 As noted in the last bullet point, Mansfield benefits from a SATURN model of its highway network which has been developed over a number of years by Nottinghamshire County Council. Although made available to Mansfield District Council for this work, it is noted that this model does not cover the full Study Area, as Market Warsop is not included in the SATURN model. As such, the Step 1 and 2 assessments of the highway network have been undertaken via a composite of baseline data from the SATURN traffic model and traffic count data in Market Warsop.

1.5.5 The SATURN model development is described in the Stage 1 assessment report.

1.5.6 Chapters containing details on 'Policy Background' and 'Base Conditions' have not been presented in this Stage 2 report. These details are documented in the Stage 1 report, the base traffic conditions and policy information has not changed since the Stage 1 document was finalised and published.

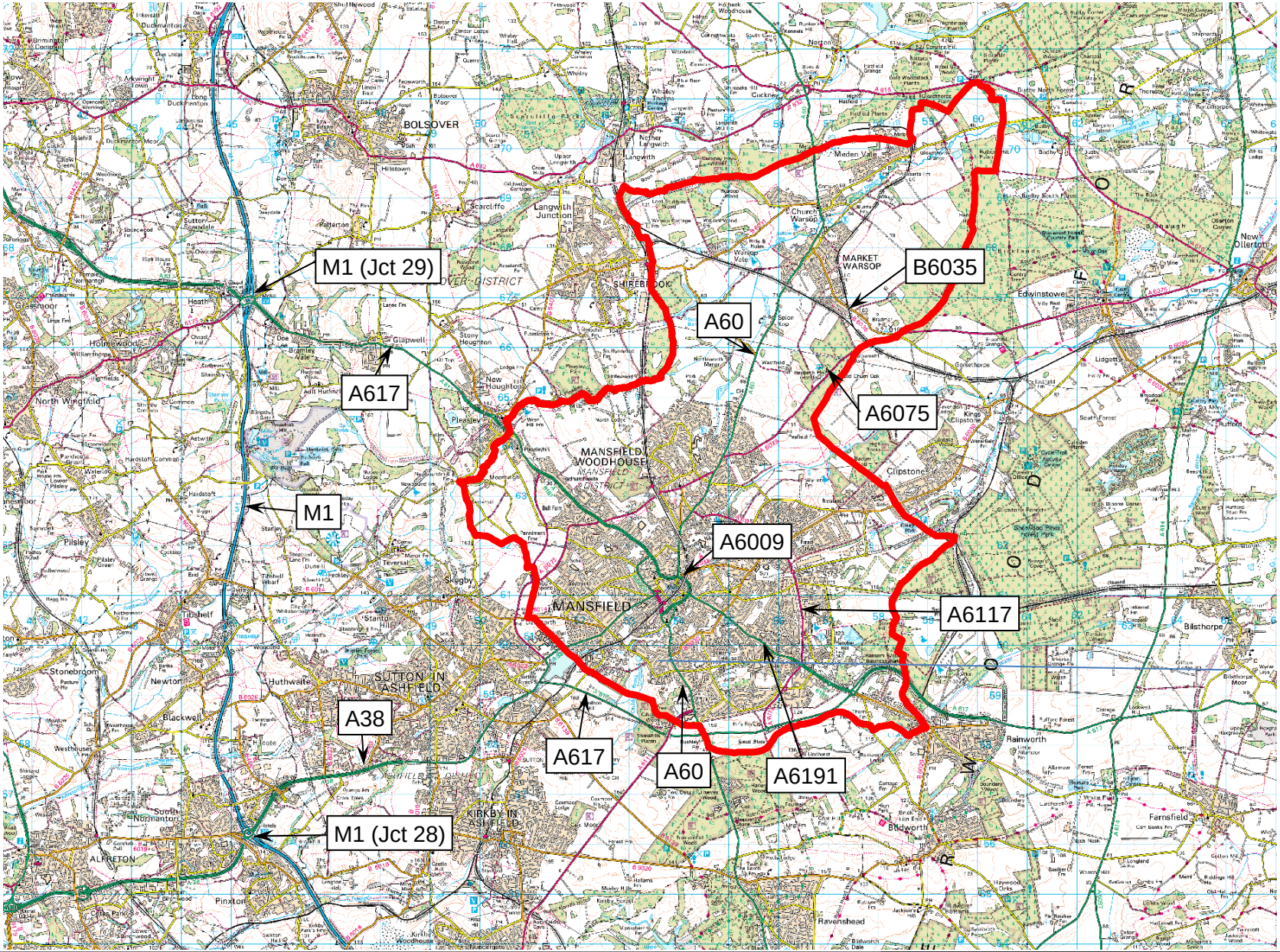


Figure 1.1: Study Area

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2 LOCAL PLAN CONDITIONS – HIGHWAY NETWORK

2.1 Overview

2.1.1 Having examined the Base Year conditions as part of Step 1 and the Reference Case as Step 2, this part of the study examines the likely future conditions within Mansfield and Market Warsop, given the most likely projections of growth and committed developments (both transport infrastructure and land-use developments) along with Local Plan 'Urban Concentration' growth sites that have been identified as possible development sites to 2031. This process forms Step 3, which is Stage 2 of the Mansfield Transport Study.

2.1.2 Step 3 forms the Local Plan growth assessment which will allow the additional Local Plan development sites to be compared against the 'Reference Case' assessments highlighting impacts upon the transport networks.

2.1.3 This section of the report documents the developments above and beyond those used in the 'Reference Case' and describes the method used to develop a 2031 Local Plan 'Urban Concentration' forecast, in the Mansfield urban area using the SATURN model. It will also identify any links or junctions that would be likely to be approaching or exceeding capacity by 2031.

2.2 Developments included in the Local Plan to 2031

2.2.1 Committed developments identified (in Step 2), as part of the 'Reference Case', were carried forward into this assessment. For the purposes of the study, committed developments are defined as major housing, commercial and retail sites with planning permission but not fully developed in the Base Year, sites with Council resolutions to grant planning permission for housing subject to signing Section 106 agreements, and other housing sites deemed suitable for development through the Strategic Housing Land Availability Assessment (SHLAA) process.

2.2.2 To this Reference Case scenario, the Local Plan 'Urban Concentration' developments were included in this Stage 2 assessment. Strategic employment, retail and housing sites were identified by Mansfield District Council along with the relevant site size or dwelling capacity. The Local Plan contains provision for 2,530 dwellings.

2.2.3 The included Local Plan developments are identified by type, on a map base in Figure 2.1 and Figure 2.2 below. They include residential, commercial and mixed use developments. Identifying site numbers for these Local Plan developments are also included. For completeness, the 'Reference Case' committed developments (identified in Step 2) are also included on the maps to show the complete development scenario up to 2031.

2.2.4 Some of the Local Plan 'Urban Concentration' growth will replace existing development which will require demolition or site clearance. To take account of this in the traffic model, traffic impacts of the cleared land-use was calculated by application of appropriate trip rates for the identified land use type and size. The resulting number of trips was removed from the matrices to give a net difference for each development site. Therefore, the total number of development trips is representative of those which would occupy each plot and sites would not appear to be unrealistically 'over developed' in the traffic model.

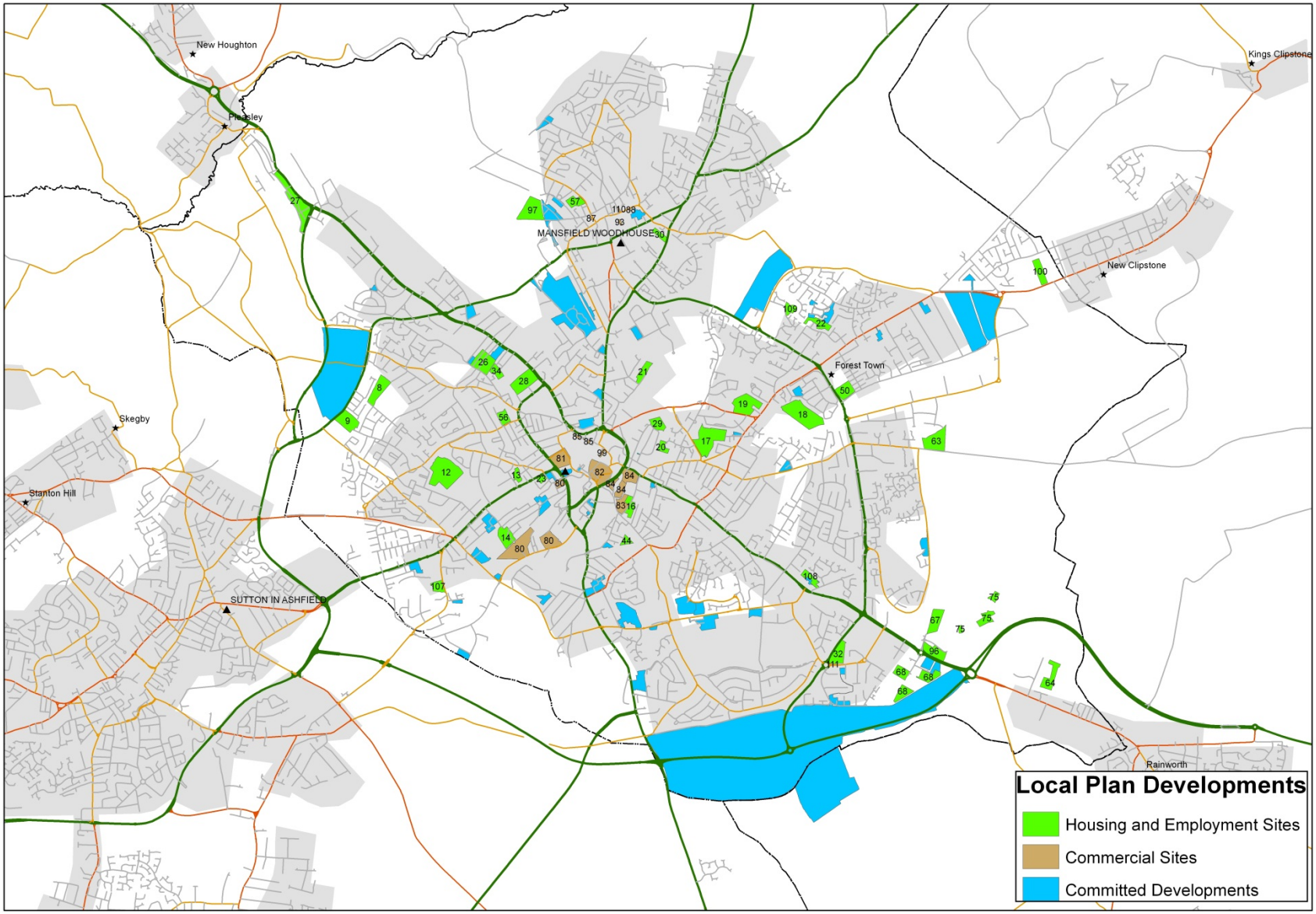

Figure 2.1: Local Plan Residential and Commercial Developments: Mansfield

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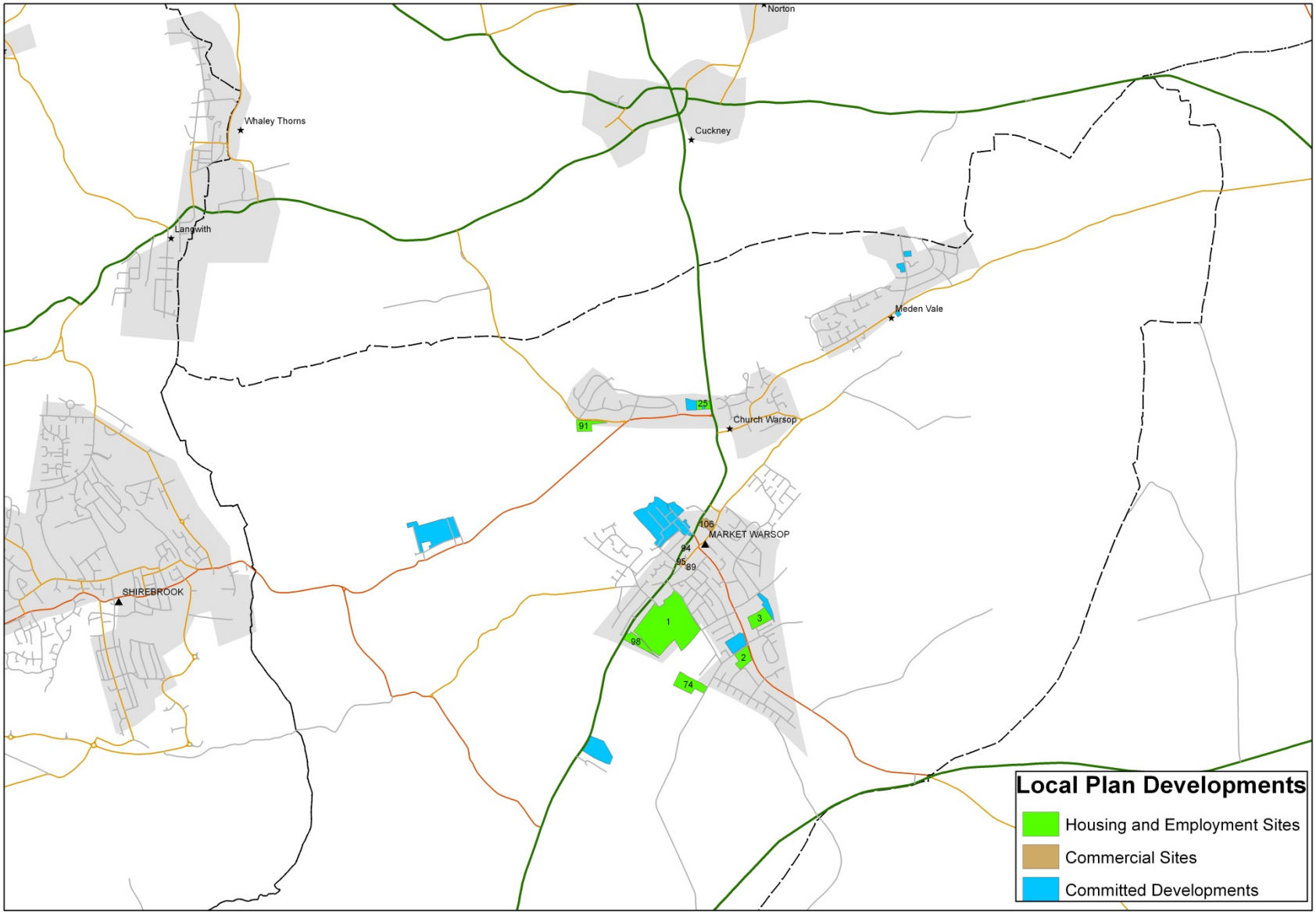

Figure 2.2: Local Plan Residential and Commercial Developments: Market Warsop

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2.2.5 The levels of development entered into the matrices of the 2031 Local Plan 'Urban Concentration' SATURN model are detailed in Appendix A. However, Table 2.1 below details the hourly trip total represented in the Base Year (2012) SATURN model, forecasts trip levels using growth factors from the Department for Transport's (DfT) National Trip End Model (NTEM) 2031, the 2031 trip totals calculated for the Reference Case (based on committed, 5-year SHLAA and pipeline developments in Mansfield District) and those additionally associated with the identified Local Plan developments (also 2031).

Table 2.1: Matrix Totals

Trip demand scenario	Total Trips	
	AM	PM
Base 2012	29,044	30,685
NTEM 2031	34,120	36,282
Reference Case 2031	34,148	36,007
Local Plan 2031	35,282	37,537

2.2.6 Table 2.1 shows that the overall level of growth contained in the DfT's NTEM growth assumptions is in line with Mansfield District Council's list of committed development, which gives confidence that the Reference Case forecasts are compatible with national economic growth forecasts. The 2031 Reference Case forecasts represent a 5,104 trips per hour (17%) increase in the AM peak trips compared to the 2012 Baseline traffic conditions. The Local Plan growth represents an increase of trips equal to 6,238 trips per hour (21%) in the AM peak and 6,852 trips (22%) in the PM Peak compared to the Baseline. The 2031 Local Plan represents an increase over the 2031 Reference Case of 1,134 trips (3.3%) in the AM peak and 1,530 trips (4.2%) in the PM peak hour.

2.2.7 The 2031 model's trip demand matrix totals were calculated for the Local Plan forecasts scenario, using the development assumptions and number of trips detailed in Appendix A, exceed those forecasts produced by the DfT's NTEM in both AM and PM Peak periods. It was not necessary, therefore, to 'top-up' the Local Plan growth to match the traffic growth benchmarks set by NTEM.

2.2.8 The extra trips associated with the Local Plan development sites were added to the Reference Case demand matrices. This method assumes that all Local Plan development trips are new to the network and will not suppress or replace the existing Reference Case (or Base) trips. This produced a robust approach to the traffic impact assessments.

2.2.9 Where Local Plan developments are proposed on sites that were occupied in 2012, and therefore trips from these sites were included within the Baseline model, these existing trips were first removed from the relevant model zone. This ensured that trip generation rates from Local Plan sites were realistic and did not double count with trips from the replaced development.

2.3 Transport Infrastructure

2.3.1 No future year highway schemes were identified which would impact upon the existing network capacity. Some of the committed development sites in the Reference Case forecasts had associated highway infrastructure as part of the development. These included:

- Lindhurst (internal link roads and access points);
- Penniment Farm (access points); and
- Prologis Park (access points).

2.3.2 These highway improvements, which were included within the 2031 Reference Case highway networks, were also included in the 2031 Local Plan highway networks.

2.3.3 For modelling purposes, it has been assumed that all Local Plan development will be able to access the local highway network without the need for internal highway construction adding to or changing the highway network and providing new routes for existing trips.

2.4 Operating Conditions

2.4.1 Using the methodology and presentation format previously exhibited for the Stage 1 analysis, the following indicators for the Local Plan (2031) highway network have been extracted from the SATURN model:

- Total flow in PCU per hour (Figure 2.3 & 2.4);
- Delay (Figure 2.7 & 2.8); and
- Volume / Capacity Ratios (Figure 2.11 & 2.12).

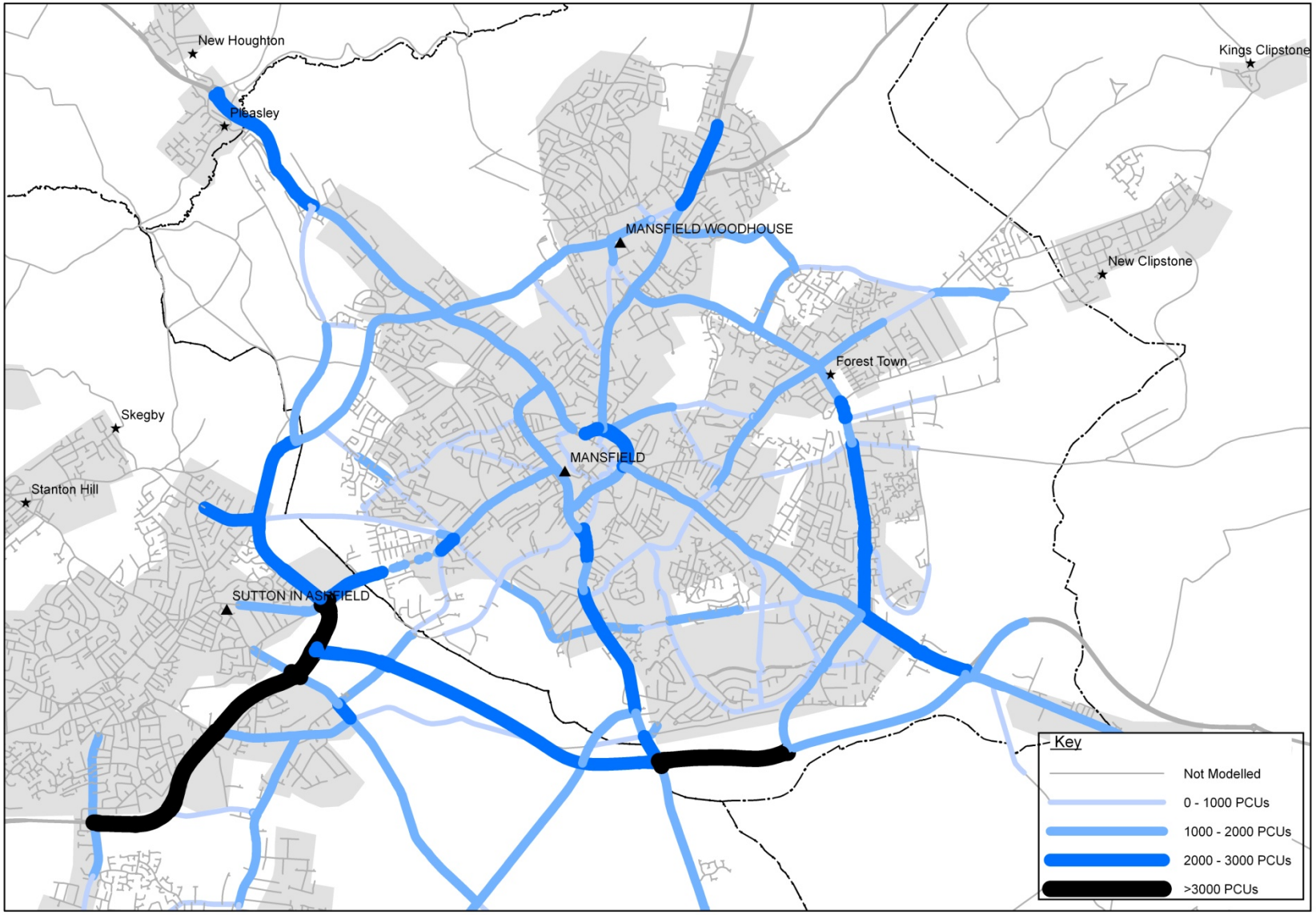
2.4.2 Additionally the total flow in PCU per hour has been presented as a percentage difference between the 2031 Reference Case and 2031 Local Plan. This analysis is presented in Figure 2.5 and 2.6 for the AM and PM Peak respectively.

2.4.3 Delay differences between the 2031 Reference Case and 2031 Local Plan scenario are presented in Figure 2.9 & 2.10 for the AM and PM Peak respectively.

2.5 Total Flow

2.5.1 The aggregate traffic flow impacts of all Local Plan developments can be seen in Figure 2.5 and 2.6. The comparison is shown as percentage change from the 2031 Reference Case scenario outlined in Stage 1, Step 2 of the Mansfield Transport Study.

2.5.2 Traffic flow changes of no more than 10% (between -10% and +10%) from the Reference Case scenario to the Local Plan scenario are considered to be within the traffic model forecasting tolerances, and to have no overall or discernable traffic impact upon the highway network.



PCUs = Passenger Car Units. 1 Car = 1 PCU / 1 Bus = 2 PCUs etc.

Figure 2.3: Local Plan (2031) AM Peak Hour Traffic Flows

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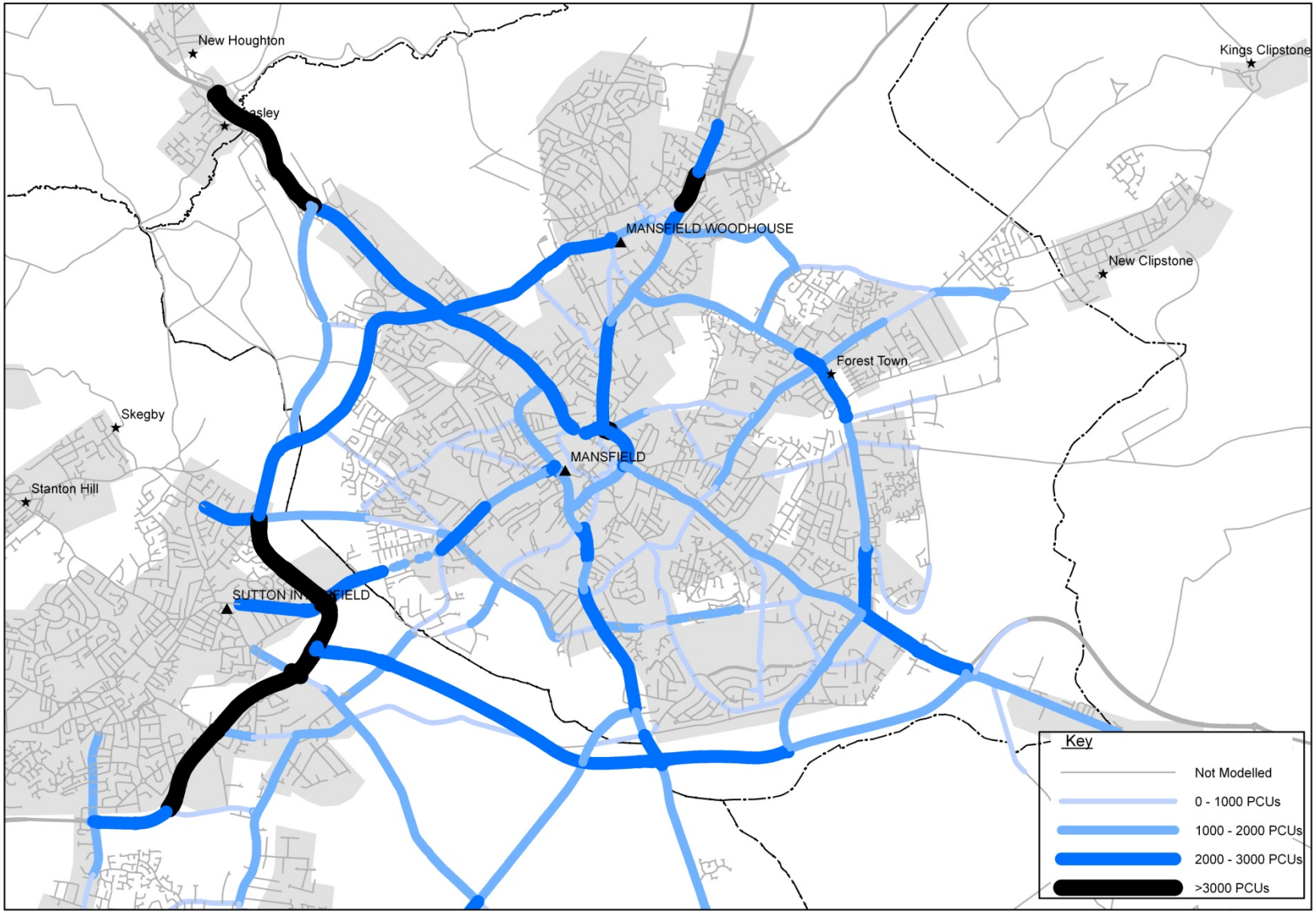

PCUs = Passenger Car Units. 1 Car = 1 PCU / 1 Bus = 2 PCUs etc.

Figure 2.4: Local Plan (2031) PM Peak Hour Traffic Flows

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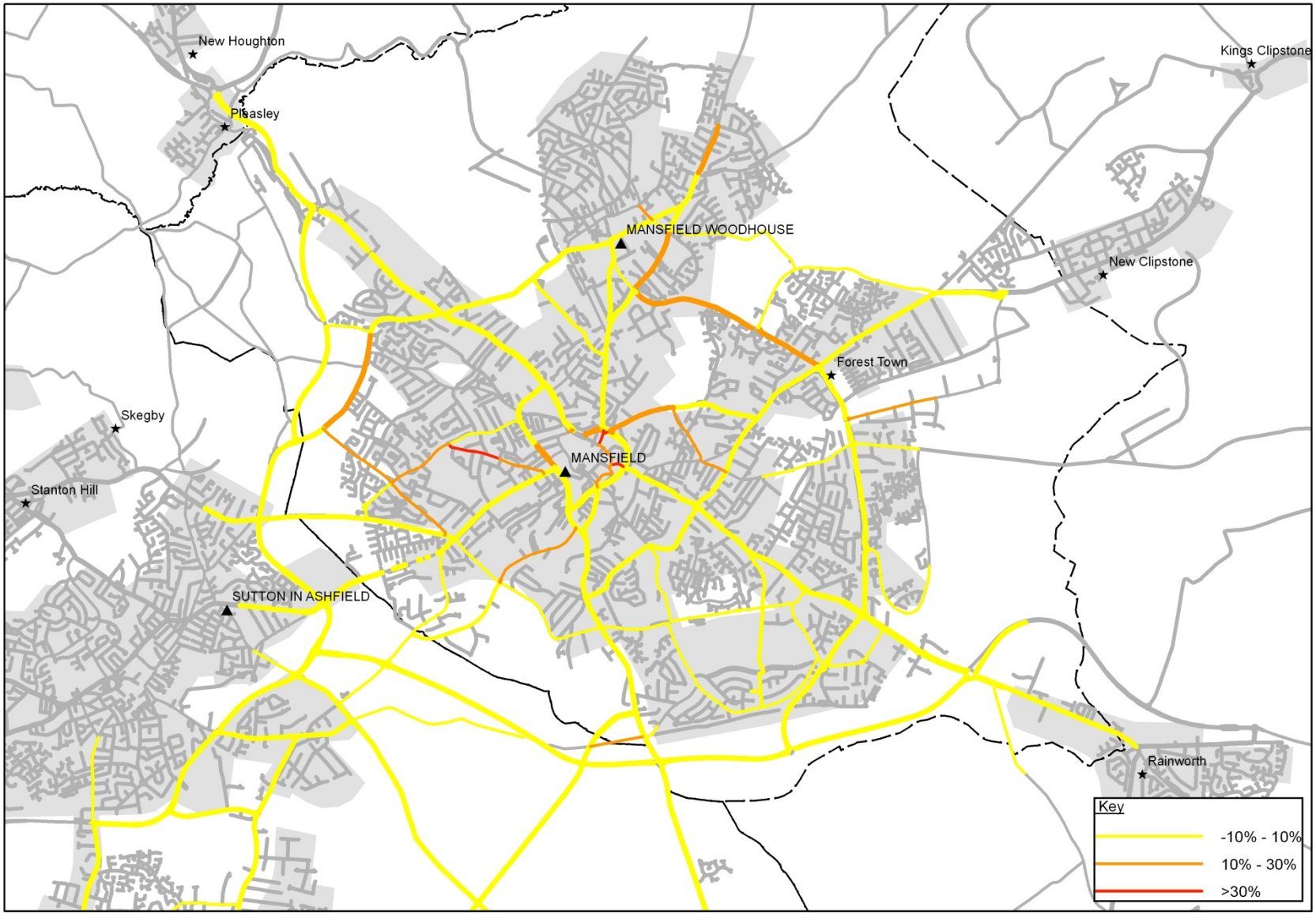

Figure 2.5: AM Peak Hour Traffic Flow Differences Between Reference Case and Local Plan (2031)

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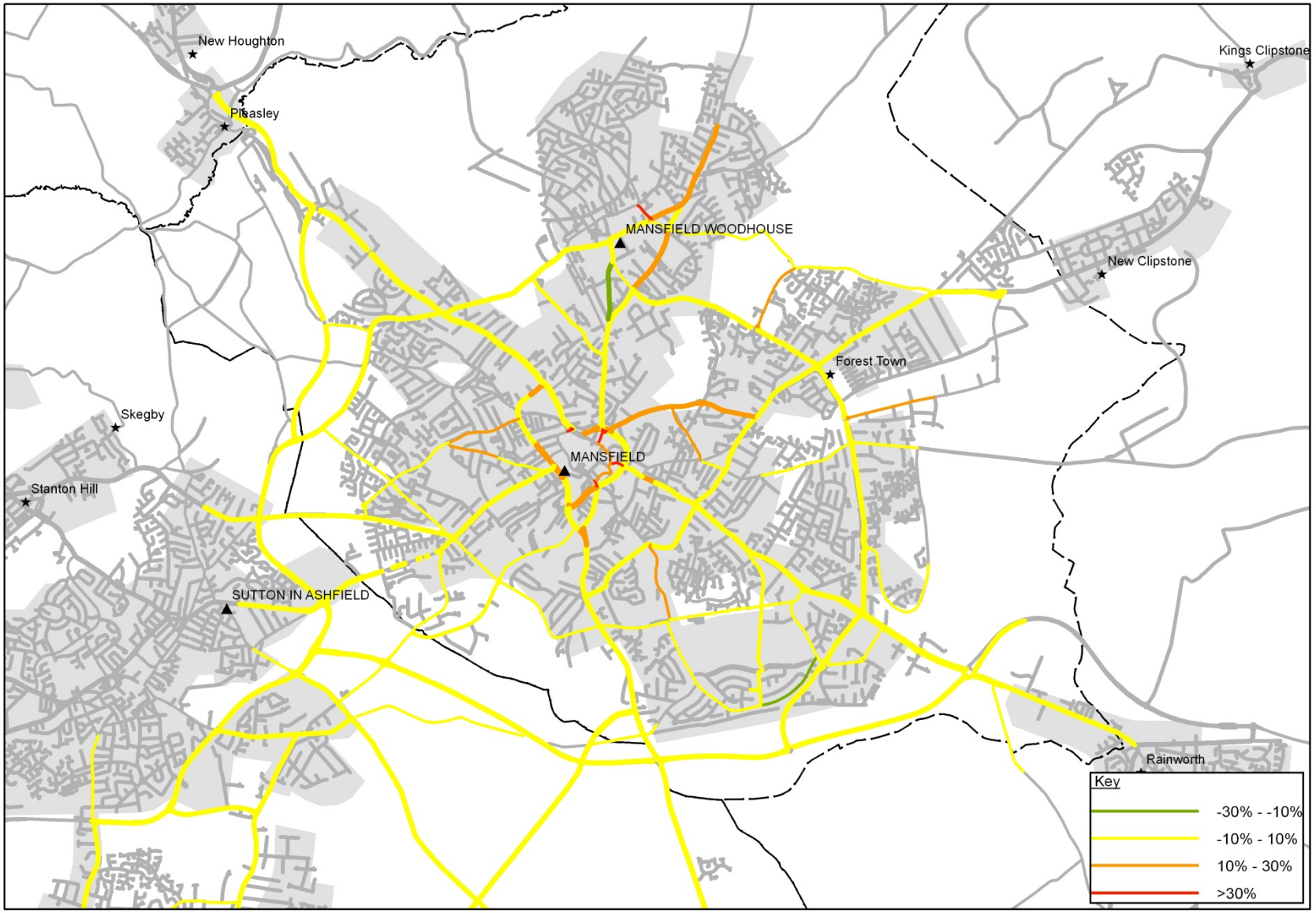

Figure 2.6: PM Peak Hour Traffic Flow Differences Between Reference Case and Local Plan (2031)

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2.5.3 In the AM Peak (Figure 2.5), the largest traffic flow increases are on the following highway links:

- A60 Leeming Lane North, and A60 Leeming Lane South;
- A6117 Old Mill Lane;
- Sandy Lane;
- Skerry Hill;
- B6033 Bath Lane;
- Cauldwell Road;
- Quarry Lane;
- Brick Kiln Lane;
- A6075 Abbott Road;
- Ladybrook Lane;
- Bancroft Lane;
- A6009 Rosemary Street;
- A6009 St Peters Way.

2.5.4 Increases between the Reference Case and Local Plan scenario along Leeming Lane are a result of a proportion of trips from the proposed development sites in Market Warsop, and to the north of the District, heading to/from Mansfield. The two-way increases on the A60 are typically of the order of up to 200 PCUs per hour in the AM Peak, Leeming Lane North increases from 2,050 to 2,250 PUCs and Leeming Lane South increases from 950 PCUs to 1,050 PCUs. In terms of highway link capacity, the A60 route would be able to accommodate these flows, and any deterioration in travel conditions would be likely to occur as junction delays. These are discussed later in reference to Figure 2.11 and Figure 2.12.

2.5.5 As a result of Local Plan development, in the AM Peak, two-way traffic flows on A6117 Old Mill Lane are predicted to increase from 1,150 PCUs to 1,300 PCUs along the western section and from 1,550 PCUs to 1,700 PCUs along the eastern section, relative to the Reference Case. Whilst on street parking is not prohibited, especially at the two ends of this link, on-street parking does not appear to be restricting traffic flow and therefore any capacity issues would be likely to occur as junction delays.

2.5.6 In the AM peak hour, the two-way forecast flows along Sandy Lane are expected to increase from approximately 450 PCUs per hour in the Reference Case to 550 PCUs per hour in the Local Plan scenario. Whilst there is on-street parking along this link, the predicted traffic flow increases are unlikely to cause additional capacity constraint given their relatively small absolute increase. Possible junction delays are considered later in this report.

2.5.7 Two-way forecast flows along Skerry Hill are forecast to increase from approximately 650 PCUs per hour in the Reference Case to 750 PCUs in the Local Plan growth scenario. It may be necessary to rationalise on-street parking, for example only allow parking on one side of the road in order to maintain two-way traffic movements.

Otherwise the overall capacity along the link and at the two end junctions would be sufficient to accommodate the forecast flow demands.

2.5.8 Along the B6033 Bath Lane, two-way traffic flows are predicted to increase from 1,050 PCUs per hour in the Reference Case to 1,200 PCUs per hour in the Local Plan scenario. The link is capable of accommodating these two-way flows as on-street parking does not restrict the traffic movements. Capacity constraint would be likely to occur as junction delays, which are discussed later in reference to Figure 2.11 and Figure 2.12.

2.5.9 The short length of Cauldwell Road between Derby Road and A60 Nottingham Road has been highlighted with a 10% to 30% increase in traffic flows. Volumes increase from 400 PCUs per hour in the Reference Case to 450 PCUs per hour in the Local Plan scenario, which is a relatively small absolute increase. The largest increase is the right turn from Derby Road and right turn out to A60 Nottingham Road. Given that there are no Local Plan development sites in the vicinity of Cauldwell Road, the flow changes highlighted by the traffic model are the result of re-assignment from more congested routes or junctions because Cauldwell Road is predicted to be quicker. Cauldwell Road has sufficient capacity to accommodate this relatively small increase in two-way movements.

2.5.10 Two-way flows along Quarry Lane are predicted to increase by between 10% and 30% from the Reference Case to Local Plan growth scenarios. This increase represents two-way traffic flow volumes of approximately 550 PCUs per hour in the Reference Case to just over 600 PCUs per hour in the Local Plan. Quarry Lane is mostly two lanes wide and would accommodate these predicted flows; however there are two pinch points mid-way along the link; at the rail bridge and at the row of housing (accessed from Sibthorpe Street). It may be necessary to enhance the traffic control system in order to manage flows through these two pinch points.

2.5.11 Brick Kiln Lane has been highlighted, both north and south of the Ladybrook Lane roundabout junction, as having a traffic flow increase between 10% and 30% as a result of the Local Plan developments, compared to the Reference Case. Flows to the north of the junction would increase from approximately 600 PCUs per hour to just under 750 PCUs per hour. It is noted that traffic calming has already been implemented on this route and on street parking may restrict capacity for through movements along Brick Kiln Lane. The flow increase can be attributed to Local Plan development sites at; Rosebrook Primary School playing fields (8) and land adjacent to the former cycling proficiency site (9), which in the SATURN model load directly onto Brick Kiln Lane. The impact to Brick Kiln Lane south of Ladybrook Lane roundabout is an increase from 550 PCUs per hour in the Reference Case to 600 PCUs per hour in the Local Plan. Along this link, there is traffic calming but two lanes of traffic movement are maintained as on-street parking is contained within marked bays. The impact of Local Plan traffic on this section of Brick Kiln Lane is likely to require no further intervention.

2.5.12 A6075 Abbott Road is predicted to have two-way traffic flow increases from 1,500 PCUs per hour in the Reference Case to 1,900 PCUs per hour in the Local Plan scenario. At this location Abbott Road is a wide single carriageway with no obstructions; typically car parking is off-road. It is expected that Abbott Road could provide sufficient capacity for the predicted Local Plan traffic flows.

2.5.13 Two-way traffic flow increases along Ladybrook Lane would be from approximately 600 PCUs per hour in the Reference Case to 650 PCUs per hour in the Local Plan scenario. Ladybrook Lane is generally wide and parking is provided either on road (both sides) or off road, two lanes are maintained. It is expected that this increase, due to the Local Plan traffic, would not be a material impact.

2.5.14 Bancroft Lane to the north of Goldsmith Street, is wide with parking provided either on-street (on both sides) or off-road with two lanes maintained for through movements. Two-way traffic flows are predicted to increase from approximately 400 PCUs per hour in the Reference Case to 500 PCUs per hour in the Local Plan scenario. It is expected that the traffic impacts of the Local Plan scenario can be accommodated by the existing highway network. The southern section of Bancroft Lane narrows as it approaches the A38 and there are fewer marked parking bays. Along this section of Bancroft Lane the two-way traffic flows are predicted to increase from approximately 750 PCUs per hour in the Reference Case to 900 PCUs per hour in the Local Plan. Given that on-street parking is already restricted in order to maintain two-way traffic flows, it is expected that the Local Plan traffic could be accommodated within the existing highway design. Any issues with the capacities at the junctions at either end of the link are considered separately in subsequent paragraphs.

2.5.15 A6009 St Peters Way has two clear lanes in both directions with no on-street parking. The two-way traffic flow would increase from the Reference Case flow of 1,150 PCUs per hour to 1,300 PCUs per hour in the Local Plan scenario. Given the capacity of the existing highway, the additional Local Plan related traffic is likely to have a minimal impact on this highway link. Any delays for through movements would occur at the traffic signalled controlled junctions.

2.5.16 A6009 Rosemary Street has two clear lanes in both directions with no on-street parking. The two-way traffic would increase from the Reference Case flow of 1,850 PCUs per hour to 2,200 PCUs per hour in the Local Plan scenario. Given the total two-way capacity available is equivalent to 4 lanes, the extra Local Plan traffic should be accommodated within the exiting highway network. An increase in the delays for through movements may occur at the traffic signalled controlled junctions which are considered later.

2.5.17 In the PM Peak (Figure 2.6), the largest traffic flow increases are on the following highway links:

- A60 Leeming Lane North, and A60 Leeming Lane South;
- A6075 Warsop Road;
- B6032 Mansfield Road;
- Sandy Lane;
- Sandlands Way
- B6033 Bath Lane and B6033 Ravensdale Road;
- Ladybrook Lane;
- Bancroft Lane;
- A6191 Ratcliffe Gate;

- Berry Hill Road;
- A60 Nottingham Road;
- A6009 Rosemary Street;
- A6009 St Peters Way.

2.5.18 Traffic increases along Leeming Lane, between the Reference Case and Local Plan scenario, are a result of a proportion of trips from the identified development sites in Market Warsop, to the north of the District, travelling to/from Mansfield. Along Leeming Lane North the two-way traffic flow increases in the PM Peak from 2,750 to 3,050 PCUs and Leeming Lane South increases from 1,350 PCUs to 1,450 PCUs. In terms of highway link capacity, Leeming Lane North may experience queuing and delays as it begins to approach capacity and free-flow traffic operation may become limited. In comparison, Leeming Lane South would be able to accommodate the predicted flows and capacity shortfalls would be likely to occur as junction delays. These are discussed later in reference to Figure 2.11 and Figure 2.12.

2.5.19 On A6075 Warsop Road, two-way traffic flows are predicted to increase from approximately 850 PCUs per hour in the Reference Case up to 950 PCUs per hour in the Local Plan scenario. Generally the link capacity should be sufficient for these levels of flow; however there may be a benefit to removing on street parking on the approach to the junction with the A60 where two-way traffic flows may become restricted.

2.5.20 A reduction of -30% to -10% is predicted to occur on the B6032 Mansfield Road as a result of trips from the Local Plan developments. The two-way traffic flow reduction is approximately 30 PCUs per hour. This occurs as traffic flow volumes increase along the A60 which restrict the ability of those routing along Mansfield Road to join the mainline at its priority junction with the A60. This additional delay at the junction would lead to subsequent rerouting of trips to more time efficient routes.

2.5.21 Two-way forecast flows along Sandy Lane in the PM Peak are expected to increase from approximately 450 PCUs per hour in the Reference Case to 550 PCUs per hour in the Local Plan scenario. Whilst there is on-street parking along this road, the predicted traffic flow increases are unlikely to cause material traffic impacts.

2.5.22 Two-way traffic flows along Sandlands Way are predicted to increase from 1,050 PCUs per hour in the Reference Case to 1,200 PCUs per hour in the Local Plan scenario. The link is currently free from traffic calming, on street parking does not occur and right turns are provided with ghost island harbourages. Therefore, the link would be able to accommodate the forecast Local Plan traffic flows.

2.5.23 Along the B6033 Bath Lane, two-way traffic flows are predicted to increase from 850 PCUs per hour in the Reference Case to 1,000 PCUs per hour in the Local Plan scenario. The link is capable of accommodating these two-way flows as on-street parking does not restrict the through traffic movements. The B6033 Ravensdale Road is predicted to have two-way traffic flow increases from 600 PCUs per hour in the Reference Case to 700 PCUs per hour in the Local Plan scenario. Whilst there is on street parking, the highway capacity is sufficient to accommodate the Local Plan scenario traffic forecasts.

2.5.24 The two-way traffic flow increases along Ladybrook Lane would be from approximately 450 PCUs per hour in the Reference Case to 500 PCUs per hour in the Local Plan scenario. Ladybrook Lane is generally wide and parking is provided either on-street (both sides) or off-road. Generally a carriageway wide enough for two lanes is maintained for the opposing traffic movements. It is expected that there would be no material traffic impacts arising from this flow increase resulting from the Local Plan scenario.

2.5.25 Bancroft Lane is wide with parking provided either on-street (both sides) or off-road and two lanes are maintained for the through movements. Two-way traffic flows are predicted to increase from approximately 300 PCUs per hour in the Reference Case to 350 PCUs per hour in the Local Plan scenario. It is expected that the traffic increases of the Local Plan scenario could be accommodated by the existing highway network.

2.5.26 A section of A6191 Ratcliffe Gate is highlighted as having a 10% to 30% traffic flow increase as a result of the Local Plan developments. The two-way traffic flow increase is from 1,300 PCUs per hour in the Reference Case to 1,450 PCUs per hour in the Local Plan. The A6191 Ratcliffe Gate, at this location, is a single carriageway link with some on street parking in marked bays – to either side of the road, but maintaining two-way traffic flows. It is expected that the traffic increases of the Local Plan scenario could be accommodated by the existing highway network.

2.5.27 Traffic volumes are predicted to increase between 10% and 30% along Berry Hill Road as a result of the Local Plan developments. The increase is approximately 40 PCUs per hour. On-street parking can occur on both sides of Berry Hill Road, but given that overall flow volumes are predicted to remain below 400 PCUs per hour, the Local Plan growth is unlikely to cause material traffic impacts.

2.5.28 A section of the A60 Nottingham Road, immediately south of Quarry Lane, has been identified as having two-way traffic flow increases between 10% and 30%. The two-way traffic flow increases from 1,800 PCUs per hour in the Reference Case to 2,000 PCUs per hour in the Local Plan scenario. Given that the total available highway capacity is equivalent to 4 lanes wide, the additional Local Plan trips should be accommodated within the exiting highway network. Delays for through movements may occur at the traffic signalled controlled junctions and this is considered later in this report.

2.5.29 A6009 Rosemary Street, north of the A38, has two clear lanes in both directions for all users and has no on-street parking. The two-way traffic flow increase in the Reference Case is from 1,250 PCUs per hour to 1,450 PCUs per hour in the Local Plan scenario. The length of A6009 Rosemary Street south of the A38, also has two clear lanes in both directions for all users and has no on-street parking. The two-way traffic flow in the Reference Case is 1,750 PCUs per hour and increases to 1,950 PCUs per hour in the Local Plan scenario. Given that the total capacity available on both sections of A6009 Rosemary Street is equivalent to 4 lanes, the Local Plan traffic would be accommodated within the existing highway network. Delays for through movements may occur at the traffic signalled controlled junctions and this is considered later in this report.

2.5.30 A6009 St Peters Way has two clear lanes in both directions for all users and no on street parking. The two-way traffic flow in the Reference Case is 2,050 PCUs per hour and increases to 2,450 PCUs per hour in the Local Plan scenario. Given the capacity

of the existing highway, the Local Plan traffic flow increase could be accommodated by this existing highway layout. Delays for through movements may occur at the traffic signalled controlled junctions and this is considered later in this report.

2.6 Travel Delays

2.6.1 Figure 2.7 and Figure 2.8 show the traffic modelled delays, in the AM and PM peak hours respectively, for the 2031 Local Plan scenario compared with the 2012 Baseline case.

2.6.2 Figure 2.9 and Figure 2.10 show the traffic modelled delays, in the AM and PM peak hours respectively, for the 2031 Local Plan scenario compared with the 2031 Reference Case forecasts.

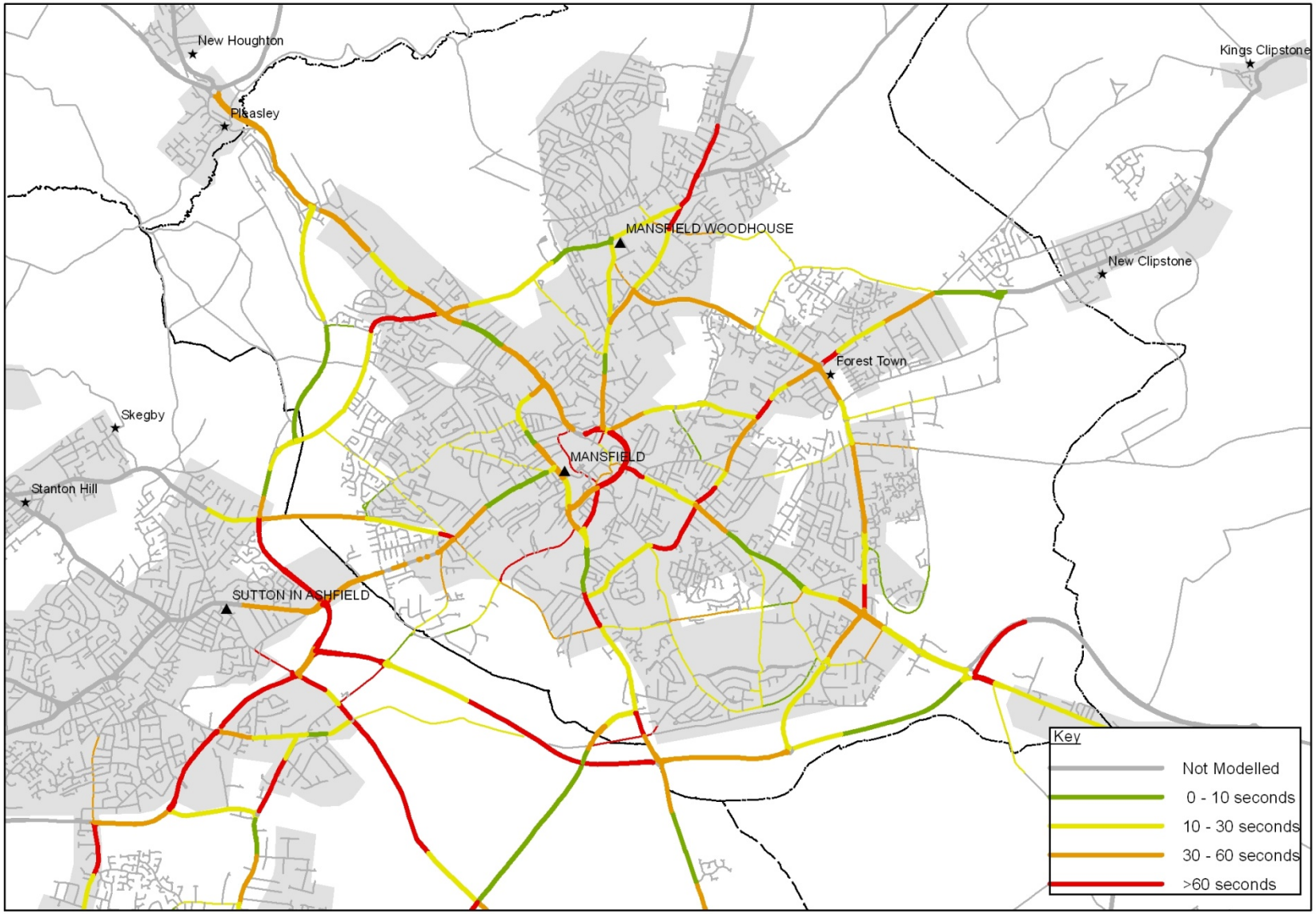

Figure 2.7: Local Plan (2031) AM Peak Hour Delays

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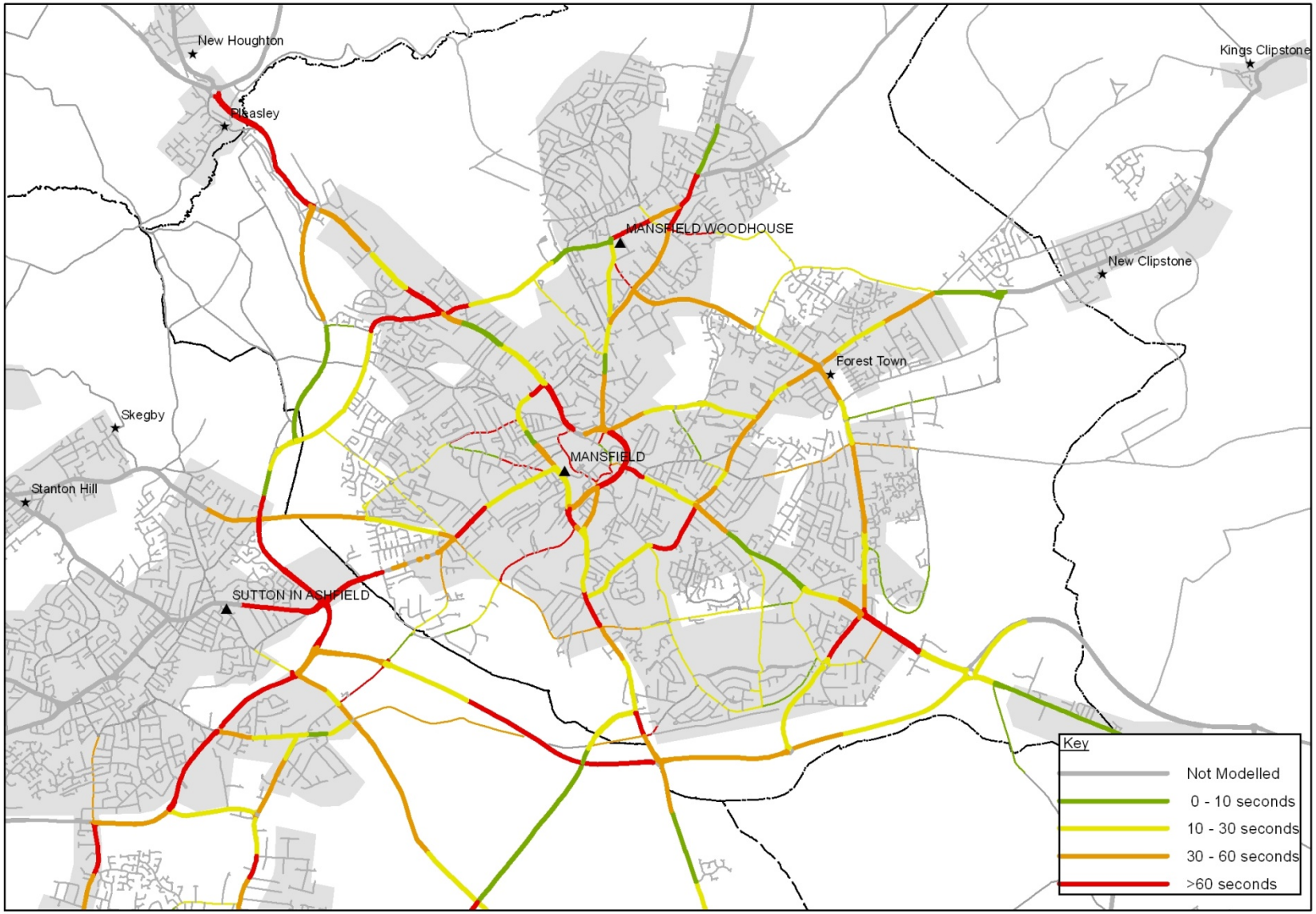

Figure 2.8: Local Plan (2031) PM Peak Hour Delays

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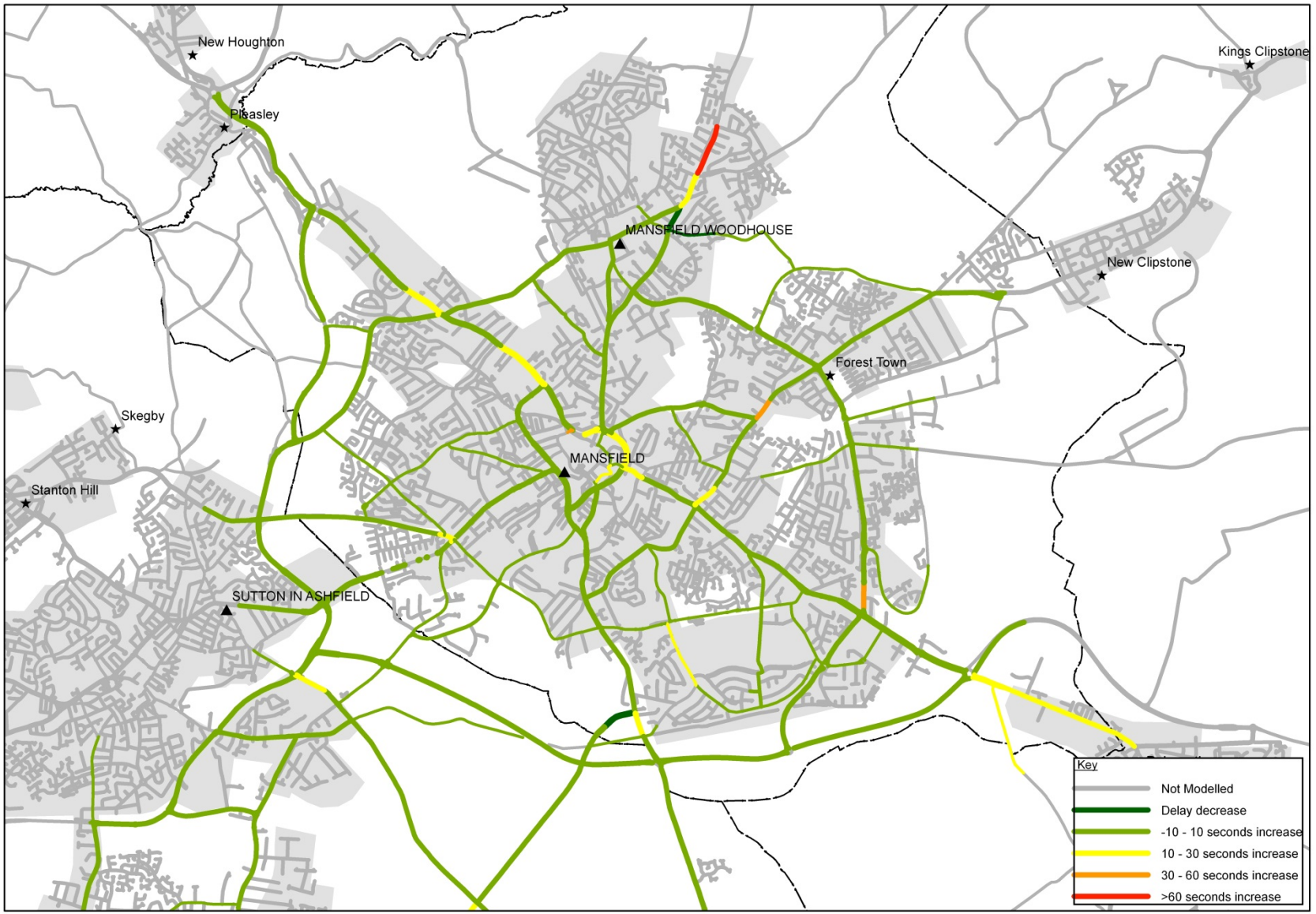

Figure 2.9: AM Peak Hour Delay Differences Between Reference Case and Local Plan (2031)

URS

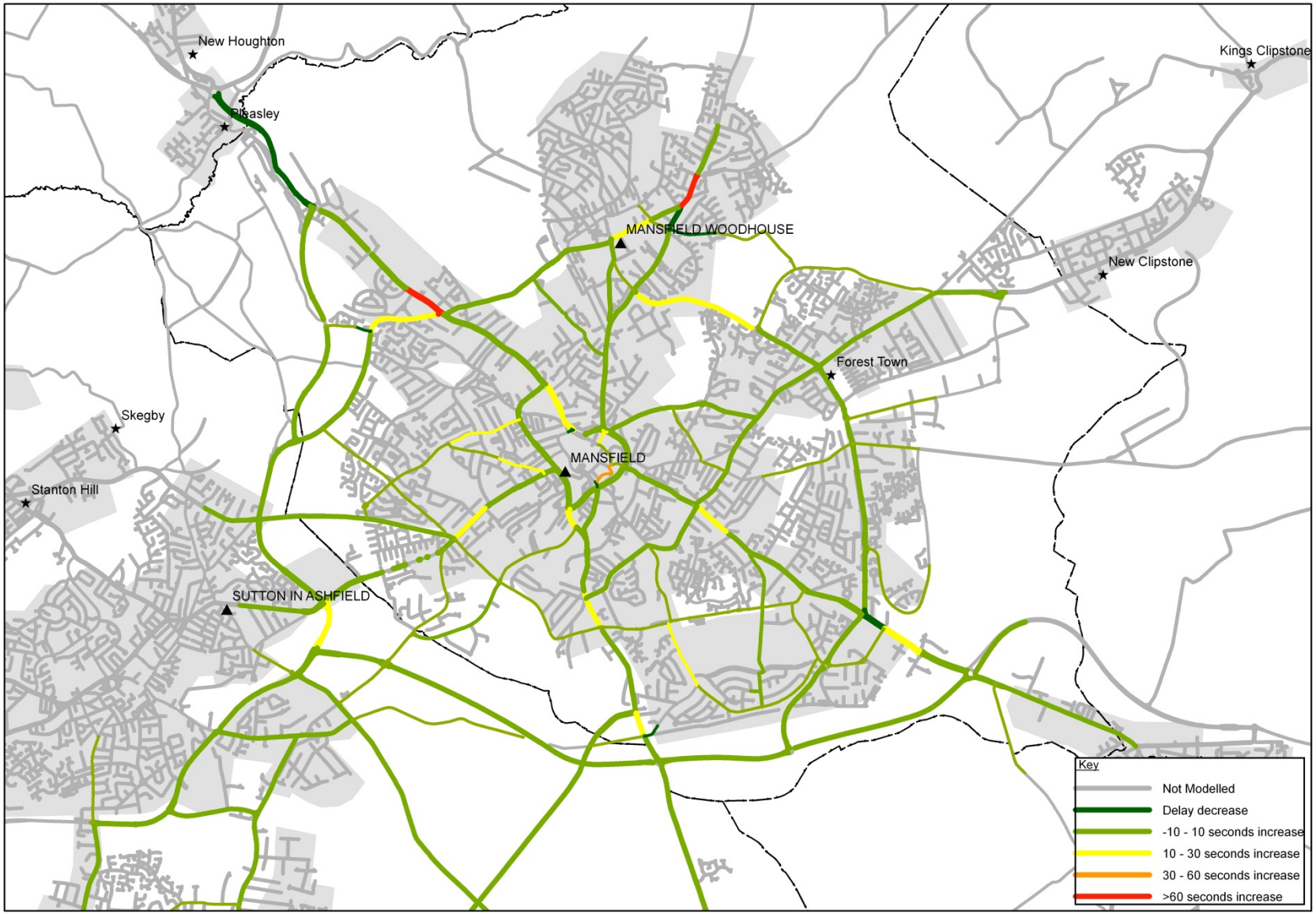

Figure 2.10: PM Peak Hour Delay Differences Between Reference Case and Local Plan (2031)

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2.6.3 Differences within the -10 to +10 seconds time band are considered to represent no change overall, as this change along a single link is unlikely to be discernable in the context of a journey made along several links and which would typically be at least several minutes. In the AM Peak (Figure 2.9) delay differences between the Local Plan and Reference Case growth scenarios highlight that additional delays would be expected to occur at:

- A60 Leeming Lane North – north of Peafield Lane;
- B6030 Sherwood Hall Road – north of Ravensdale Road;
- A6117 Oak Tree Lane – north of Southwell Road.

2.6.4 Smaller delay increases (10-30 seconds) in the AM Peak occur on the following road lengths:

- A60 Leeming Lane – south of Peafield Lane;
- A60 Nottingham Road – approaching A611 Derby Road;
- A60 St Peters Way;
- B6020 Southwell Road east – at Rainworth;
- B6030 Carter Lane – approaching Rock Hill;
- Lichfield Lane;
- B6014 Skegby Lane – approaching A38 Sutton Road;
- A6191 Chesterfield Road North – North of Abbott Road junction;
- A6191 Chesterfield Road South – approaching Rosemary Street;
- A6191 Ratcliffe Gate – approaching St Peters Way.

2.6.5 Delay decreases in the AM Peak are observed to occur on the following road lengths:

- A60 Leeming Lane South – between A6075 Warsop Road and New Mill Lane;
- A611 Derby Road – approaching A60 Nottingham Road;
- Peafield Lane.

2.6.6 In the AM peak, the delay-increases along the A60 from the northeast, which are due to the traffic flow increases highlighted in the previous section. Specifically, the delays on the approaches to the Peafield Lane and Warsop Road junction will store vehicles in queues and will thus reduce traffic demands on the A60 south downstream. The increased delays at the Warsop Road junction are partially offset by reduced delays at subsequent, downstream junctions.

2.6.7 Delays along Skegby Lane approaching the A38 are the result of an increase in traffic flows, as evidenced in Figure 2.9, along Brick Kiln Lane. The increase in demand reaching A38 Sutton Road / Skegby Lane traffic signal junction results in additional model delay at this location.

2.6.8 In the PM Peak (Figure 2.10), the delay differences between the Local Plan and Reference Case highlight increases on the following road lengths:

- A60 Leeming Lane north – between A6075 Peafield Lane and Warsop Road;
- A6191 Chesterfield Road North – north of Abbott Road junction.

2.6.9 Smaller delay increases (10-30 seconds) in the PM Peak occur on the following road lengths:

- A6191 Southwell Road west – between Bellamy Road and Oak Leaf Close;
- A6191 Southwell Road west – between King George V Ave and Windsor Rd;
- A60 Nottingham Road – approaching A611 Derby Road;
- A60 Nottingham Road – between Forest Road and Berry Hill Lane;
- A60 Nottingham Road – between Quarry Lane and St Peters Way;
- A38 Sutton Road – between Skegby Lane and Botany Avenue;
- A6009 Chesterfield Road south – south of Rosemary Street;
- A6075 Abbott Road – between Water Lane and Chesterfield Road;
- Lichfield Lane;
- Bancroft Lane approaching A38;
- Ladybrook Lane between Bancroft Avenue and A6009.

2.6.10 In the PM Peak delay decreases are observed to occur on the following road lengths:

- A617 Chesterfield Road north – past Pleasley;
- A60 Leeming Lane south – between A6075 Warsop Road and New Mill Lane;
- A6191 Southwell Road west – between Bellamy Road and Oak Tree Lane;
- Lichfield Lane – approaching A60 Nottingham Road;
- Water Lane – approaching A6075 Abbott Road.

2.6.11 Delays along the A60 Leeming Lane north show a similar effect in the PM Peak to those outlined earlier in the AM Peak, at paragraph 2.6.6, where vehicles stored in queues at one junction upstream will result in reduced demand, and consequently less delays, later in the journey.

2.6.12 A6191 Chesterfield Road north and A6075 Abbott Road both experience increases in delays because traffic demands at the adjacent traffic signalled junctions increase in the Local Plan scenario. Junction capacities are considered in Figure 2.12 and Appendix B.

2.6.13 Delays along the A60 Nottingham Road increase at three separate locations. The operational performance of these junctions is considered in Figure 2.12 and at Appendix B.

2.6.14 Delays on the A6191 Southwell Road West would increase at two locations and decrease mid-way between these two points. Where delays increase at one junction, some of the extra traffic demand is held in queues so that at the next junction downstream the traffic demand on the A6191 is reduced and the junctions can operate more efficiently.

2.6.15 Increases in delays along Bancroft Lane and Ladybrook Lane are a result of the increased flows in the Local Plan scenario; as seen in Figure 2.9.

2.7 Volume Over Capacity

2.7.1 Figure 2.11 and Figure 2.12 show the ratio of forecast flow volume (V) to the highway capacity (C), for the AM and PM peak hours respectively, with the 2031 Local Plan scenario traffic demand forecasts assigned to the Mansfield highway network. These are referred to as Volume/Capacity (V/C) ratio diagrams.

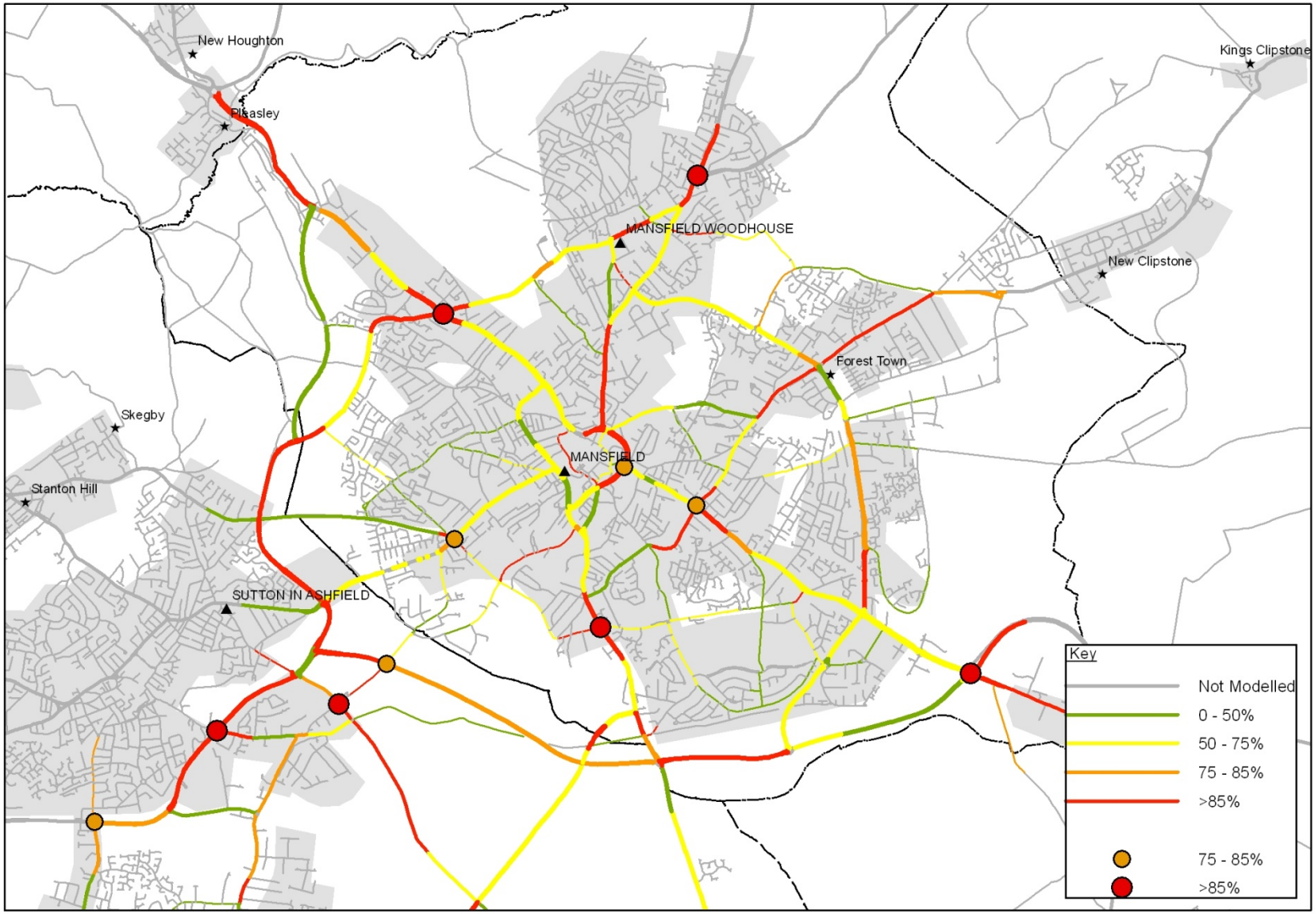

Figure 2.11: Local Plan (2031) AM Peak Hour Volume / Capacity Ratio

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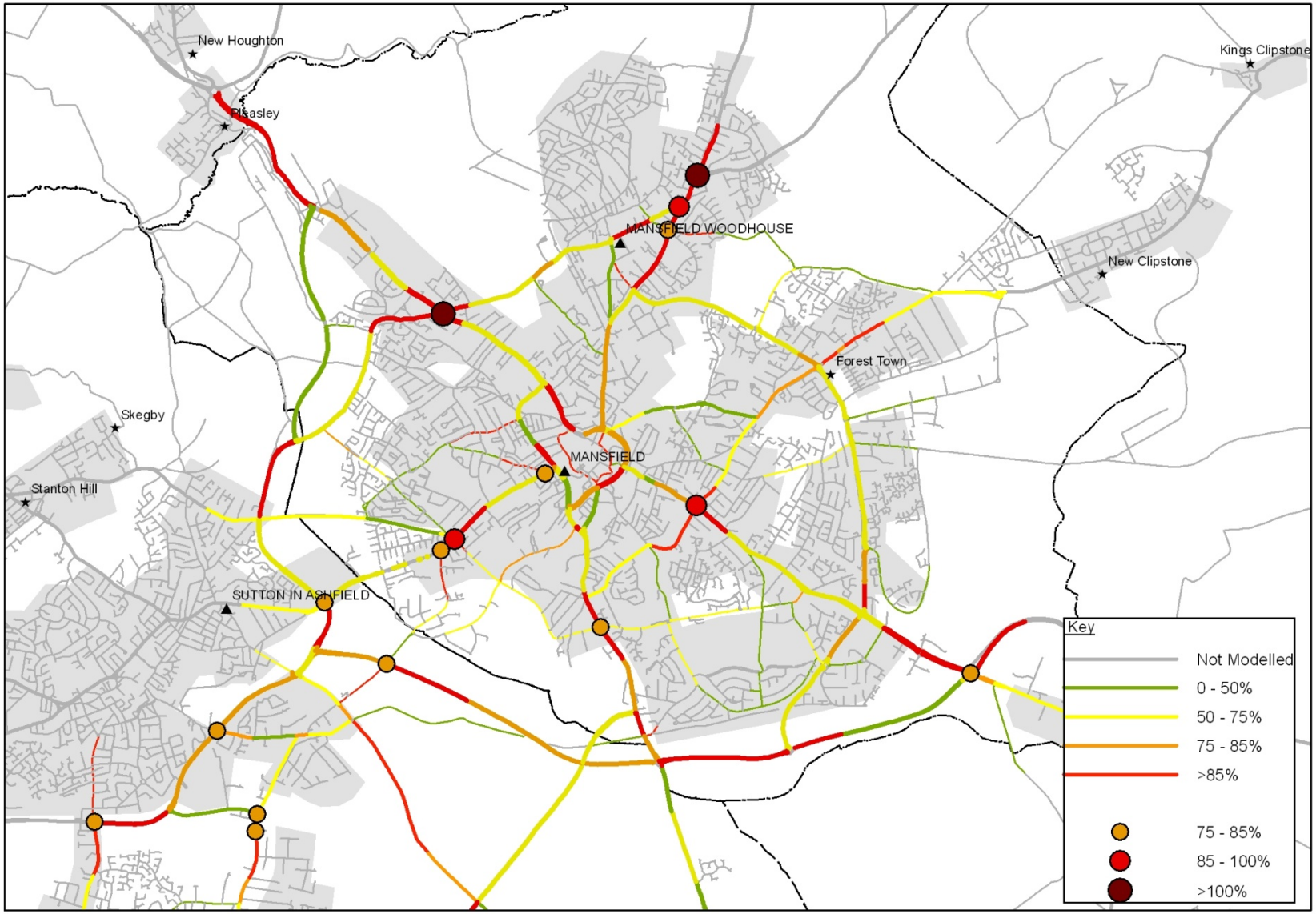

Figure 2.12: Local Plan (2031) PM Peak Hour Volume / Capacity Ratio

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2.8 Traffic Impact on Junctions in Mansfield

2.8.1 The SATURN traffic model was used to identify those junctions that would be operating at, or over capacity in the forecast year of 2031 with Local Plan developments. It is noted that the traffic modelling method makes a number of assumptions about the operation of the highway network and therefore, at the appropriate time, a separate Transport Assessment is likely to be required for each individual development and the highway authority may require mitigation measures at junctions other than those identified in this strategic study. The traffic model identifies where traffic flows are likely to increase and traffic delays might worsen as a result of the cumulative impact of the proposed Local Plan development sites.

2.8.2 Given that traffic growth is expected from the Baseline year of 2012 to the forecast 2031, then it is expected that junctions across the highway network will be more heavily loaded in future years. The 2031 Local Plan traffic forecast model was interrogated to determine those junctions with a traffic V/C ratio of more than 0.85. Detailed junction modelling has been undertaken on the junctions identified from the Base Year analysis and the Reference Case 2031 analysis (as reported at Stage 1) plus one additional junction highlighted by the 2031 Local Plan analysis.

2.8.3 This process highlighted the following eight junctions within the Mansfield urban area:

- Chesterfield Road / Debdale Lane;
- A60 Nottingham Road / Berry Hill Lane;
- Carter Lane / Southwell Road / Windsor Road;
- A60 Leeming Lane / New Mill Lane;
- A617 MARR / A6191 Southwell Road;
- A60 Leeming Lane / Peafield Lane;
- A38 Sutton Road / Skegby Lane;
- A60 Leeming Lane / A6075 Warsop Road

2.8.4 Of the eight junctions identified above, only the A60 Leeming Lane / A6075 Warsop Road junction was not highlighted from the SATURN model outputs in either the Baseline (2012) analysis or the Reference Case (2031) analysis as potentially being over capacity. The existing seven junction models which were built in detail and described in the Baseline and Reference Case were updated with the Local Plan forecast junction turning movements to assess the operational performance of the Local Plan growth forecast in 2031. The additional junction at A60 Leeming Lane / A6075 Warsop Road was modelled in detail with the 2031 Local Plan forecast assigned.

2.8.5 Outside of the area of the traffic model, the traffic growth is likely to follow the Nottinghamshire rural growth forecasts. The 2012 Baseline assessments identified one junction in Market Warsop that was approaching capacity, which was the A60 Church Street / Wood Street traffic signalled junction. This junction was included within the detailed junction analysis.

2.8.6 The detailed junction assessment results for all of these junctions are summarised in Table 2.2, the Reference Case results are reproduced from the Stage 1 report for comparison purposes.

2.8.7 In the AM Peak hour the Carter Lane / Southwell Road / Windsor Road junction changes from operating within capacity to being 'Near to or at capacity' as a result of the Local Plan developments. A deterioration of conditions also occurs at the junctions of A60 Leeming Lane / New Mill Lane and A60 Church Street / Wood Street in the AM Peak where conditions change from 'Near to or at capacity' to 'Over capacity'. The junction of A60 Nottingham Road / Berry Hill Lane operates 'Over capacity' in the AM Peak in both the Reference Case and Local Plan growth scenario, at this junction, queuing and delays would need to be addressed in the Reference Case.

2.8.8 In the PM Peak hour; A60 Nottingham Road / Berry Hill Lane, Carter Lane / Southwell Road / Windsor Road and A38 Sutton Road / Skegby Lane junctions all experience a deterioration in conditions from 'Near to or at capacity' to 'Over capacity' as a result of the Local Plan growth. In the PM Peak, A60 Leeming Lane / New Mill Lane and A60 Church Street / Wood Street would operate 'Over capacity' in both the Reference Case and Local Plan growth scenarios, therefore queuing and delays would need to be addressed in the Reference Case.

2.8.9 In both the AM Peak and PM Peak the A617 MARR / A6191 Southwell Road remains operating within capacity; i.e. no significant deterioration in operating conditions. It is expected that this junction would not require mitigation works. The junction of Chesterfield Road / Debdale Lane operates 'Over Capacity' in the AM Peak and PM Peak in both the Reference Case and Local Plan growth scenarios. At this junction, queuing and delays would need to be addressed in the Reference Case.

2.8.10 Appendix B provides further detail with regard to these junction assessments.

2.8.11 The detailed junction modelling results, presented in Table 2.2, confirm that eight of the nine identified junctions would operate 'Near to or at Capacity' (Degree of Saturation >90%) or 'Over Capacity' in the 2031 Local Plan scenario forecast. The only exception is A617 MARR / A6191 Southwell Road which would operate within capacity in both time periods. This junction, whilst highlighted as potentially being an issue in the AM Peak hour using the outputs from the SATURN model, was subsequently found to operate acceptably using the more detailed and locally-focussed ARCADY model that is specific to the junction. The apparent differences between capacity assessments may be attributed to the differences in the detail of the assessment methods between the SATURN and ARCADY software programmes.

Table 2.2: Junction Capacity Assessments – Base Year, Reference Case and Local Plan

Junction	Base Year (2012)		Reference Case (2031)		Local Plan (2031)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Chesterfield Road / Debdale Lane	Near to or At Capacity	Over Capacity	Over Capacity	Over Capacity	Over Capacity	Over Capacity
A60 Nottingham Road / Berry Hill Lane	✓	✓	Over Capacity	Near to or At Capacity	Over Capacity	Over Capacity
Carter Ln / Southwell Rd / Windsor Rd	✓	✓	✓	Near to or At Capacity	Near to or At Capacity	Over Capacity
A60 Leeming Lane / New Mill Lane	✓	Near to or At Capacity	Near to or At Capacity	Over Capacity	Over Capacity	Over Capacity
A617 MARR / A6191 Southwell Road	✓	✓	✓	✓	✓	✓
A60 Leeming Lane / Peafield Lane	✓	✓	✓	✓	✓	Near to or At Capacity
A38 Sutton Road / Skegby Lane	Near to or At Capacity	✓	Near to or At Capacity	Near to or At Capacity	✓	Over Capacity
A60 Church Street / Wood Street	✓	✓	Near to or At Capacity	Over Capacity	Over Capacity	Over Capacity
A60 Leeming Lane / A6075 Warsop Road	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Over Capacity	Over Capacity

✓ Indicates that the operational performance of the junction would be acceptable; i.e. RFC less than 0.85 for a roundabout or priority junction or Degree of Saturation less than 0.9 for a traffic signal junction.

2.8.12 Following the network operational performance assessment, given above, there may be a benefit to installing CCTV at certain junctions and along key corridors, the following locations have been identified;

- A6191 Chesterfield Road / MARR;
- A6191 Chesterfield Road / Rosemary Street;
- A6191 Chesterfield Road / Debdale Lane;
- A60 Leeming Lane / Old Mill Lane;
- A60 Woodhouse Road / A6009 St Peters Way / B6033 Bath Lane
- B6030 Clipstone Road / A6117 Old Mill Lane / Pump Hollow Road;
- A617 Southwell Road / Oak Tree Lane;
- A60 Nottingham Road / Park Lane / Baums Lane;
- A60 Nottingham Road / A611 Derby Road;
- A60 Nottingham Road / Berry Hill Lane / Atkin Lane;
- A60 Portland Street / A6009 Portland Street / A6009 St Peters Way;
- A38 Sutton Road / Sheepbridge Lane / Skegby Lane;
- A6009 Rosemary Street / Ladybrook Lane;
- A6009 St Peters Way / Nottingham Road / Albert Street;
- A6009 St Peters Way / A6191 Ratcliffe Gate;
- A6009 Chesterfield Road / St John Street;
- A6191 Rock Hill / Southwell Road West / B6030 Windsor Road / Carter Lane.

2.8.13 CCTV will allow the urban traffic control centre to monitor the relevant routes covered by the system to identify any day to day variability and one off events as they occur on the highway network. In response to incidents, it would be possible to alter signal settings to adapt to changed flow patterns and intervene to speed up the clearing of queues after such events.

2.9 Other Junctions Outside Of Mansfield District

2.9.1 An assessment of the Local Plan (2031) development traffic entering the Strategic Road Network (SRN) was required as part of the Mansfield Transport Study Brief. “The Strategic Road Network (SRN) in England consists of the motorways and the most significant A-roads. It is managed by the Highways Agency, which is an executive agency of the Department for Transport (DfT).” (House of Commons Transport Committee, 2014).

2.9.2 There are no Strategic Trunk Roads within Mansfield District and the nearest one is the M1 motorway to the west. As the M1 is not included in the Mansfield traffic model, flow changes on the A38 approaching Junction 28 and the A617 approaching

M1 Junction 29 are presented in Table 2.3 below as the closest possible links included in the SATURN traffic model. The A611 leaves the traffic modelled area on the south side of Mansfield and the A608 branches-off this A611 route to access the M1 at Junction 27, this is also included in Table 2.3.

2.9.3 Table 2.3 presents the percentage change in traffic flows comparing the 2031 forecast Reference Case to the 2012 Base Year model flows (Reference Case) and the 2031 forecast Local Plan to the 2012 Base Year model flows (Local Plan). These comparisons are provided for both AM and PM Peak periods and for both traffic flow directions independently.

Table 2.3: Changes in Traffic On Roads Approaching the M1 between the Baseline and Reference Case / Local Plan

		Change in traffic flows – compared to Baseline (%)			
		AM		PM	
		Reference Case	Local Plan	Reference Case	Local Plan
A38	Westbound	-0.5%	-0.5%	8.3%	8.4%
	Eastbound	5.3%	5.4%	4.9%	4.6%
A617	Westbound	-1.2%	0.7%	7.1%	9.4%
	Eastbound	4.3%	9.7%	4.4%	7.2%
A611	Southbound	3.0%	3.0%	11.9%	12.6%
	Northbound	8.9%	9.1%	6.7%	6.9%

2.9.4 Table 2.4 presents the absolute change in flows between the 2031 Reference Case and 2031 Local Plan growth scenario, the changes are measured in the number of PCUs per hour.

Table 2.4: Changes in Traffic Volumes between the Reference Case and Local Plan

		Change in traffic flows (PCU per hour-Demand)	
		AM	PM
A38	Westbound	-1	+1
	Eastbound	+1	-3
A617	Westbound	+16	+48
	Eastbound	+58	+27
A611	Southbound	0	+8
	Northbound	+2	+2

2.9.5 From Table 2.3 it is evident that on the A38 and A617 in the westbound direction, there is a reduction in trips in the AM period between the Base Year and Reference Case. Over the period between the Base Year (2012) and the Reference Case (2031) it would usually be expected that positive traffic growth would occur. The reduction is a result of the forecasting process which identified that the number of trips generated as a result of the Committed Developments was equal to NTEM growth projections. Subsequently the Alternative Assumptions methodology within TEMPRO was used to provide forecast factors which assumed that there would be no other development led growth in Mansfield District. The Alternative Assumptions assume that overall, without development led traffic, there would otherwise be slight

reductions in trips generated between 2012 and 2031. It is necessary to balance the trip ends of the matrices using a Furness procedure, which in the AM Peak is fixed to the origin trip levels, so trips heading westbound and away from Mansfield have been reduced. The identified Committed Development sites in Mansfield will tend to redistribute the existing AM outbound trips away from the A38 and A617 corridors.

2.9.6 Table 2.4 compares the Local Plan scenario with the Reference Case and indicates minimal changes in the flows on the A611 and A38 corridors in the AM and PM peaks. Whilst Local Plan growth has been added to the Reference Case trip demand matrices, and therefore an increase between the two might be expected, reductions in trips occur because some Local Plan developments are located at sites that are already occupied in the Base Year model. Where this has occurred, an estimate of trips to be removed has been made first before adding in the predicted trips generated by the Local Plan developments. Where development intensity is lower than previous uses of the land, or a new development is constructed whose type has lower trip generations, there are fewer trips expected in the Local Plan than those in the Reference Case.

2.9.7 Any flow restrictions along these routes, due to the capacity limitations of junctions along these routes, would limit the volume of traffic reaching the M1 motorway. As Table 2.4 indicates, any changes in flow between the Reference Case and Local Plan forecasts are less than 60 PCU per hour which, in URS' view, is likely to have no material impact on the operation of the M1 motorway.

2.9.8 Along with the routes approaching the SRN detailed above, there are also other major routes that cross the district boundary, mainly: A617 Rainworth Bypass and A60 Nottingham Road. Additionally the A60 Leeming Lane is a major route entering Mansfield, but not crossing the district boundary.

Table 2.5: Changes in Traffic On Primary Roads At the edge of Mansfield District between the Baseline and Reference Case / Local Plan

		Change in traffic flows – compared to Baseline (%)			
		AM		PM	
		Reference Case	Local Plan	Reference Case	Local Plan
A60 Leeming Ln	Northbound	15.2%	26.0%	16.7%	30.7%
	Southbound	18.9%	32.5%	14.2%	29.3%
A617 Rainworth	Eastbound	-15.4%	-15.5%	5.1%	5.1%
	Westbound	2.7%	2.8%	2.8%	2.4%
A60 Nott'ham Rd	Northbound	9.0%	9.0%	3.2%	3.0%
	Southbound	-5.4%	-5.6%	9.4%	9.6%

Table 2.6: Changes in Traffic Volumes between the Reference Case and Local Plan

		Change in traffic flows (PCU per hour-Demand)	
		AM	PM
A60 Leeming Lane	Northbound	+79	+179
	Southbound	+136	+124
A617 Rainworth Bypass	Eastbound	-1	0
	Westbound	+1	-3
A60 Nottingham Rd	Northbound	0	-2
	Southbound	-2	+2

2.9.9 Along A60 Leeming Lane there are predicted to be an additional 79 trips in the AM Peak in the northbound direction as a result of the Local Plan developments when compared with the Reference Case, this represents a 26% increase over the Base Year scenario. In the PM Peak an additional 179 Local Plan trips in the northbound direction result in a 30.7% increase over the Base Year. In the southbound direction along Leeming Lane there would be an additional 136 Local Plan trips in the AM Peak when compared to the Reference Case, which is an overall increase of 32.5% over the Base Year. In the PM Peak in the southbound direction there would be an additional 124 Local Plan trips compared to the Reference Case which is a 29.3% increase over the Base Year.

2.9.10 On A617 Rainworth bypass in the eastbound direction, there is a reduction in trips between the Base Year and Reference Case. This is a result of the forecasting process as described earlier in paragraph 2.9.5. Between the Reference Case and Local Plan scenario there is a decrease of 1 trip in the AM Peak eastbound direction, which represents an overall decrease of 15.5% when compared to the Base Year. In the eastbound direction in the PM Peak there is predicted to be no change between the Reference Case and Local Plan, overall there is a 5.1% increase in traffic flow compared to the Base Year.

2.9.11 On A60 Nottingham Road in the AM Peak and PM Peak in both directions the total flow change between the Reference Case and Local Plan scenario is within the range -/+2 trips. When compared to the Base Year, there is a predicted to be a 9% increase in trips in the northbound direction in the AM Peak and 3% increase in the PM Peak. In the southbound direction there is predicted to be a 5.6% reduction in the AM Peak compared to the Base Year and a 9.6% increase in the PM Peak.

2.9.12 Further to the above, there are other junctions identified by the SATURN modelling which may experience capacity issues in the 2031 Local Plan forecast (but which are located outside of the Mansfield District's Transport Study Area). These junctions fall within the A38 and the A617 corridors. Table 2.7 provides a qualitative assessment of these junctions:

Table 2.7: Changes in Traffic Outside the Study Area

Junction	Qualitative Assessment
A617 MARR / Prologis Park development junction	This junction provides an access to a committed development. Reference should be made to the transport assessment for this site. The Local Plan developments would add some additional trips to this junction, but the increase and subsequent impact is not material to this junction.
A617 MARR / Hamilton Road	The traffic model indicates that the V/C indicator would increase from 75% in 2012 to 79% in the 2031 Reference Case and 85% in the Local Plan. The route would continue to operate within acceptable V/C stress levels under the 2031 Local Plan forecast.
A38 / Kings Mill Road East / Mansfield Road	The traffic model indicates that the V/C indicator would increase from 72% in 2012 to 77% in the 2031 Reference Case. A V/C of 77% is also the case in the Local Plan forecast. Detailed junction analysis suggests that the Degree of Saturation would be approximately 100% in the 2031 Reference Case PM peak hour. With the Local Plan growth, detailed junction assessment predicts a Degree of Saturation in excess of 100% in the PM Peak. Mitigation at this junction is likely to be required.
B6139 Coxmoor Road / Hamilton Road	The V/C indicator shows 87% in the 2031 Local Plan forecast, this was 85% in the Reference Case and 73% in 2012. The route would continue to operate within acceptable V/C stress levels under the 2031 Local Plan forecast.
A38 Kings Mill Road East / B6022 Station Road	The traffic model indicates that the V/C indicator would increase from 82% in 2012 to 86% in the Reference Case and 87% in the Local Plan. This indicates that the traffic impact of the Local Plan is not material.
A38 Kings Mill Road East / B6018 Sutton Road / Kirkby Road	The traffic model indicates that the V/C indicator is 84% in 2012 and would remain at 84% in the 2031 Local Plan forecast. The traffic impact of the Local Plan is not material.

2.10 Impact on Public Transport Services

2.10.1 Any change in journey times may impact on public transport services. Table 2.8, below summarises the modelled journey times (excluding stops) extracted from the SATURN model for vehicles travelling along six key routes (as identified in Figure 2.13). Times are compared for the Baseline (2012), Reference Case (2031 RC) and Local Plan (2031 LP) forecasting models.

Table 2.8: Changes in Journey Time (seconds) on Key Routes (shown on Figure 2.13)

AM Peak		2012	2031RC	2031 LP	RC Time Increase	RC % change	LP - RC Increase	LP - RC % change
Route 1	Inbound	351	502	525	151	43.0	23	4.6
	Outbound	236	252	262	16	6.8	10	4.0
Route 2	Inbound	534	597	652	63	11.8	55	9.2
	Outbound	368	378	381	10	2.7	3	0.8
Route 3	Inbound	410	409	422	-1	-0.2	13	3.2
	Outbound	319	331	332	12	3.8	1	0.3
Route 4	Inbound	258	260	265	2	0.8	5	1.9
	Outbound	250	258	261	8	3.2	3	1.2
Route 5	Inbound	389	399	414	10	2.6	15	3.8
	Outbound	396	397	398	1	0.3	1	0.3
Route 6	Inbound	330	371	388	41	12.4	17	4.6
	Outbound	342	363	368	21	6.1	5	1.4
Journey times are in seconds (s) Reference Case increases are from 2012 Base conditions, Local Plan increases are from Reference Case.								

PM Peak		2012	2031 RC	2031 LP	RC Time Increase	RC % change	LP - RC Increase	LP - RC % change
Route 1	Inbound	335	401	486	66	19.7	85	21.2
	Outbound	314	338	346	24	7.6	8	2.4
Route 2	Inbound	404	427	430	23	5.7	3	0.7
	Outbound	423	469	461	46	10.9	-8	-1.7
Route 3	Inbound	388	420	440	32	8.2	20	4.8
	Outbound	319	322	324	3	0.9	2	0.6
Route 4	Inbound	264	271	282	7	2.7	11	4.1
	Outbound	278	288	301	10	3.6	13	4.5
Route 5	Inbound	399	404	468	5	1.3	64	15.8
	Outbound	448	472	477	24	5.4	5	1.1
Route 6	Inbound	389	390	439	1	0.3	49	12.6
	Outbound	418	390	416	-28	-6.7	26	6.7
Journey times are in seconds (s) Reference Case increases are from 2012 Base conditions, Local Plan increases are from Reference Case.								

2.10.2 Detailed journey time–distance charts for the key routes are provided in Appendix C.

2.10.3 In response to longer travel times, bus operators may need to adjust their timetables or add extra buses to the service in order to compensate for the extra time that buses spend in travelling.

2.10.4 The travelling journey time for bus services, excluding waiting time at stops, would increase for all routes between the 2012 Base Year and the 2031 Local Plan forecast, except Route 6 outbound in the PM Peak only.

2.10.5 **Route 1:** The largest travel time changes are predicted to occur along Route 1 (A60 North of Mansfield), particularly in the inbound direction. In the AM Peak a 151 second increase is recorded between the Base Year and Reference Case, implementing the Local Plan developments would result in an additional 23 second delay along this route. Overall the journey time would increase from just under 6 minutes in the Base Year to just under 9 minutes in the Local Plan scenario. In the PM Peak the journey time would increase by 66 seconds between the Base Year and Reference Case and a further 85 seconds between the Local Plan scenario and the Reference Case. In the outbound direction there would be a total travel time increase of 26 seconds between the Local Plan and Base Year in the AM Peak and 32 seconds in the PM Peak. Nottinghamshire County Council currently has plans for public transport improvements along this corridor which will mitigate against the Reference Case growth.

2.10.6 Whilst, in the AM Peak, small additional delays are predicted to occur at the junctions of A60 Woodhouse Road / A6009 St Peters Way (upto 7 seconds) and A60 Leeming Lane / Old Mill Lane / Butt Lane (36 seconds) most additional junction delay would occur at A60 Leeming Lane / A6075 Warsop Road (87 seconds). In the PM Peak, an additional 88 seconds delay is predicted at this junction when compared to the Reference Case.

2.10.7 The greatest increase in 2 way journey times is predicted to occur along Route 1 in the PM Peak as a result of the Local Plan developments. Bus services 10, 11 and 12 operate along this route, the shortest two-way journey times of these services is timetabled to take 65 minutes (service 11; Meden Vale - Mansfield). The additional 93 seconds delay, compared with the Reference Case growth scenario represents a 2.4% increase in the overall two-way travel time. Public service operators will need to respond to increased journey times due to natural forecast traffic growth. The extra impact of development trips is small by comparison.

2.10.8 **Route 2:** Route 2 represents the B6030 Sherwood Hall Road, the largest impact of Local Plan traffic growth on Route 2 is predicted to occur in the AM Peak in the inbound direction. An additional 55 seconds delay is predicted to occur which represents a 9% increase in travel times compared to the Reference Case. In this direction, the Reference Case would add an additional 63 seconds of delay along this route over the Base Year assessment. In the AM Peak outbound direction, and both directions in the PM Peak the journey time changes are negligible when compared with the Reference Case scenario.

2.10.9 The additional delay along Route 2 inbound in the AM Peak would occur at B6030 Sherwood Hall Road / B6033 Ravensdale Road (68 seconds), a 24 second delay is predicted to occur at this junction in the Reference Case. At A6191 Rock Hill / Southwell Road West / B6030 Carter Lane a delay of 37 seconds would occur in the Local Plan scenario.

2.10.10 Bus services 14 (Kirton – Mansfield) and 15 (Walesby - Mansfield) operate along the assessed section of B6030. Typical two-way journey times for these services – over the whole route would be 106 minutes in the AM Peak. The additional delay of 58 seconds represents 0.9% of the total journey time.

2.10.11 **Route 3:** Increases along Route 3 (A6191 Southwell Road West) as a result of the Local Plan growth scenario are limited to a maximum increase of 20 seconds in the inbound direction in the PM Peak. This represents a journey time increase of 4.8%. An additional 32 seconds journey time increase is observed between the Reference Case and Base Year in the PM Peak inbound direction, the total additional delay between the Base Year and Local Plan is estimated to be 52 seconds.

2.10.12 **Route 4:** The greatest increase in journey time along the A38 Sutton Road / Stockwell Gate route, as a result of the Local Plan, occurs in the PM Peak outbound direction. The increase of 13 seconds represents a journey time increase of 4.5%.

2.10.13 **Route 5:** As a result of Local Plan developments, Route 5 (A6191 Chesterfield Road North / South), is predicted to experience the greatest increase in travel time delay in the PM Peak in the inbound direction. An increase of 64 seconds represents an increase of 15.8% along this route. The next greatest increase occurs in the AM Peak inbound direction, this is 15 seconds and represents an increase of 3.8%.

2.10.14 On Route 5 inbound in the PM Peak, 64 seconds of additional delay would occur at A6191 Chesterfield Road North / Chesterfield Road South / Abbott Road / Debdale Lane when compared to the Reference Case scenario.

2.10.15 Bus services 9, 10, 17, 23, 53, N23 and Pronto operate along this route, the shortest two-way operation is Service 23 (Langwith – Mansfield), this is currently timetabled to take 83 minutes in the PM Peak. The 69 second two-way journey time increase would represent a 1.4% increase in the total bus two-way journey time for this route.

2.10.16 **Route 6:** Increases in journey time along A60 Nottingham Road would be greatest in the PM Peak in the inbound direction. A predicted 49 second increase between the Local Plan and Reference Case would represent a journey time increase of 12.6%. Also in the PM Peak, in the outbound direction the journey time would increase by 26 seconds representing 6.7%.

2.10.17 It should be noted that a predicted improvement in modelled journey time occurs along Route 6 outbound in the PM Peak in the Reference Case scenario as the signal timings at A60 Nottingham Road / Berry Hill Lane / Atkin Lane, in the SATURN model were optimised in the future year. This represents adjustments which would be likely to occur automatically as a result of MOVA control at this location. Therefore the difference between the Base Year and Local Plan scenario is predicted to be an overall slight improvement in the PM Peak outbound direction.

2.10.18 On Route 6 inbound in the PM Peak additional delays, compared to the Reference Case, are predicted to occur at A60 Nottingham Road / A611 Derby Road (18 seconds) and A6009 Portland Street / A60 Portland Street / A6009 St. Peters Way (23 seconds).

2.10.19 Bus services 3c, 19 and Pronto operate partially over this section of the A60. Service 19 (Berry Hill – Mansfield) has the shortest operating route taking 18 minutes for a complete two-way journey. A total two-way travel time increase of 75 seconds would represent a 6.9% increase in operating time for this service. It should be noted though, that this service does not currently operate in the PM Peak and the journey

time increase is a worst case, not taking into account the 'benefit' achieved in the Reference Case scenario.

2.10.20 Nottinghamshire County Council also have plans in place for public transport improvements to the A60 Nottingham Road which will mitigate against the Reference Case growth.

2.11 Local Plan Mitigation

2.11.1 Two further options exist for mitigation measures to improve the expected journey times predicted by the Local Plan growth scenario. INIT has developed a bus priority system, called LISA, which can transmit a message to the traffic signal controller to either request a green signal or extend the green time further. A message is transmitted again once the vehicle has passed the signals. This is beneficial over more typical traffic signal bus priority measures as it is not impacted by weather variables, it does not need a line of sight between the vehicle and controller and it can determine when to switch back to 'normal' operations.

2.11.2 A second option that can be installed, most beneficially as a corridor scheme, would be a system of CCTV cameras, which can monitor the progress of vehicles and identify where issues are occurring. This would allow, in the case of traffic signal junctions, an operator to react to day to day variability and manually intervene. Where other traffic incidents occur, a coordinated response can be determined at the earliest possible opportunity. The possibility, and best locations, for this type of intervention have been identified in 2.8.12 above.

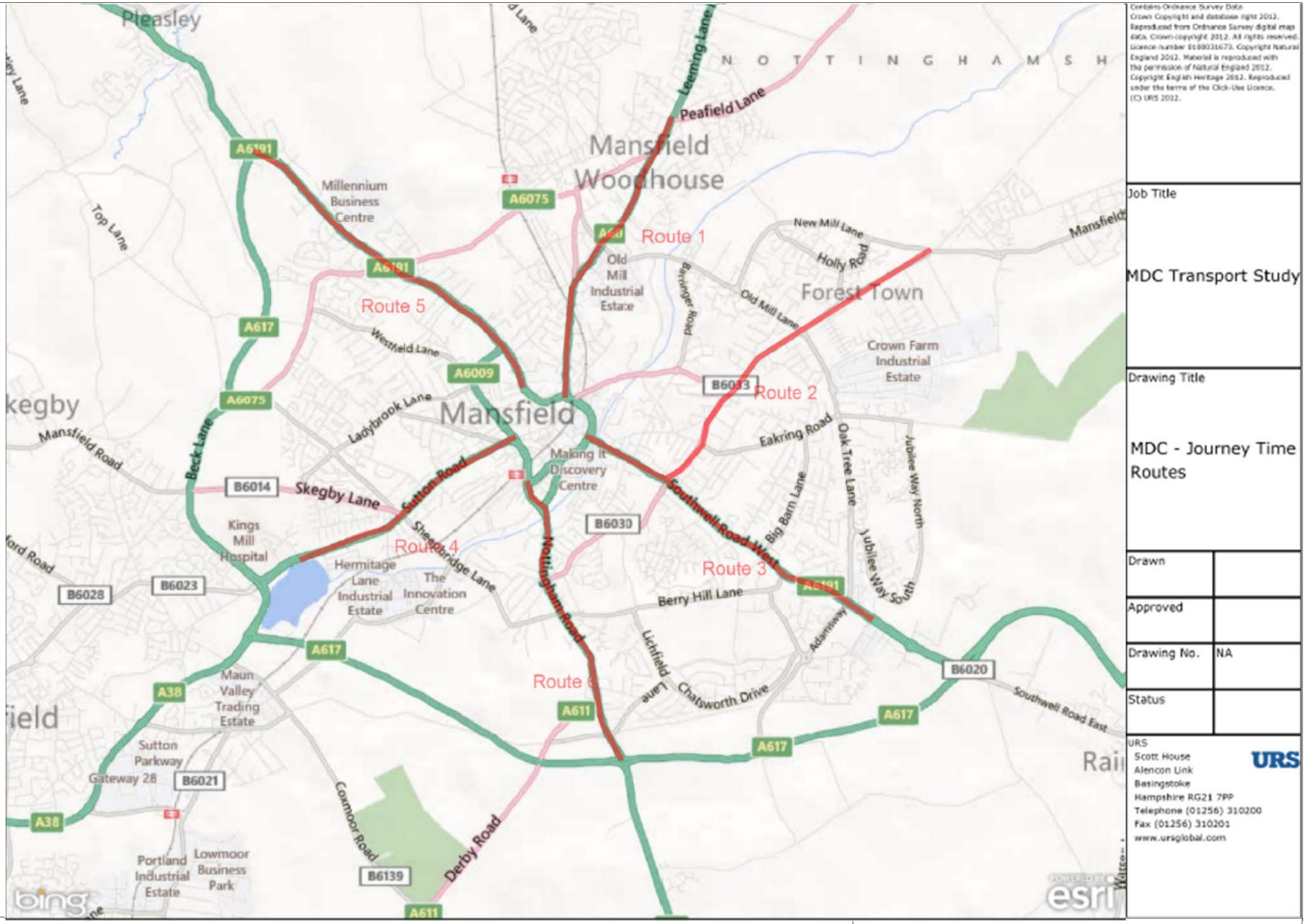

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Figure 2.13: Public Transport Journey Times (relating to Table 2.8)

3 SECURING SUSTAINABLE TRANSPORT

3.1 Overview

3.1.1 This section sets out an approach to securing sustainable transport in relation to development plans.

3.1.2 In the last ten years, there has been a much greater focus on securing transport sustainability. This has now been fully articulated in both the DfT's Guidance on Transport Assessment and the Delivering a Sustainable Transport System strategy.

3.1.3 The most widely quoted definition of sustainability and sustainable development was developed by the Brundtland Commission of the United Nations which stated that;

"sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

3.1.4 In transport terms, sustainability is often taken as being the ability to access development without the use of a private car - with a particular focus on reducing single-occupancy car trips[1]. As such, it is focused on providing opportunities to make cycling, walking and public transport the modes of choice. In order for this to be successful, these modes must be made more convenient than the private car for the majority of trips.

3.1.5 The more trips that can be accommodated by sustainable means, the less private car traffic a development would generate. This section identifies how sustainable transport choices could be secured and locked-in to the developments via the planning process (i.e. how sites could enhance their sustainable transport-mode shares).

3.1.6 This approach is consistent with the Guidance on Transport Assessment, which seeks to maximise transport sustainability prior to the identification of measures to accommodate residual trips.

3.2 Development Location and Mix

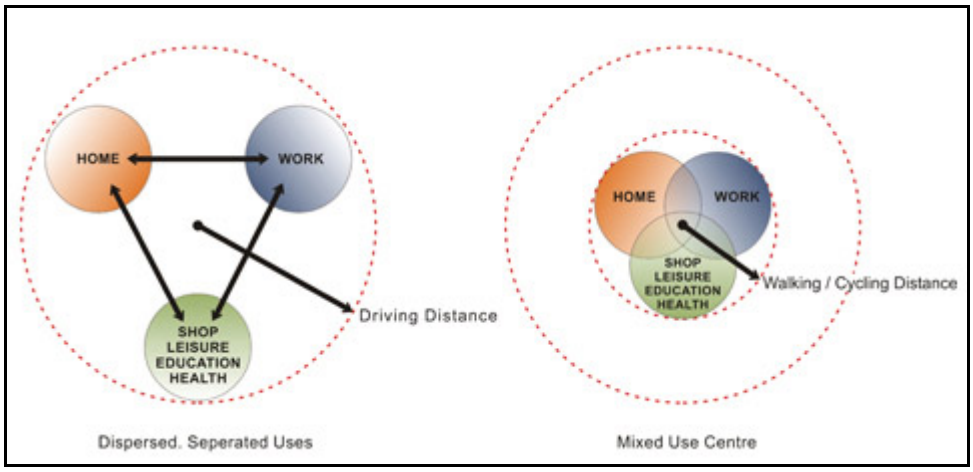
3.2.1 It is recognised that the requirement to interchange during a particular trip is an important dissuasive factor when selecting overall mode choice. Following from this, it is important to note that the most "door-to-door" trips over medium to long distances are provided only by the private car.

3.2.2 Walking and cycling modes are "door-to-door" over short distances (normally taken to be up to 2km and 5km respectively) and public transport has traditionally been effective at moving people within defined corridors of movement.

3.2.3 As such, ensuring that different land-uses (including key services and facilities) are contained within a geographic area (either the development itself or the proximate neighbourhood) is often taken as being a key enabler of sustainable-mode trips such that real mode choice is available to those wishing to travel. This is illustrated within Figure 3.1, below.

[1] Transport Sustainability is often mistaken for "anti-car" policies; though Travel Planning often encourages car sharing schemes that seek to minimise single-occupancy trips by replacing these with multi-occupant car journeys.

Figure 3.1: Mixed Use Development (taken from www.plan4sustainabletravel.org)



3.2.4 From the above figure, it can be seen that having several land uses within a defined area is to allow multiple activities to occur from one trip, to shorten trip lengths and to encourage non-motorised trips by making common destinations available within walking / cycling distance.

3.2.5 Table 3.1 indicates how various land-use design features are estimated to reduce per capita vehicle trip generation compared with conventional development that lacks these features;

Table 3.1: Travel Impacts of Land Use Design Features
(Source: Victoria Transport Policy Institute, 2001, from DISTILLATE - Design and Implementation Support Tools for Integrated Local Land use, Transport and the Environment, April 2006)

Design Feature	Reduced Vehicle Travel
Residential development around public transport nodes	10%
Commercial development around public transport nodes	15%
Residential development along public transport corridor	5%
Commercial development along public transport corridor	7%
Residential mixed-use development around public transport nodes	15%
Commercial mixed-use development around public transport nodes	20%
Residential mixed-use development around public transport corridor	7%
Commercial mixed-use development around public transport corridor	10%
Residential mixed-use development	5%
Commercial mixed-use development	7%

Notes (1) In this table, “residential mixed-use development” would indicate a residential development with our land-use integrated into the development form, whereas residential development indicates a wholly residential development
(2) public transport node = bus or train station

3.2.6 Table 3.1 shows the relative importance of mixed-use development, public transport corridors and public transport nodes; with the latter (i.e. bus and train stations) having the greatest impact.

3.2.7 Research into the impacts of providing a mix of land-use types within a neighbourhood has found that;

- The presence of local facilities has a positive effect on mode choice (i.e. more non-car trips) but more so on car ownership, particularly multiple car ownership (Dargay and Hanly, 2004).
- Diversity of services and facilities in close proximity to households reduces distance travelled (Banister, 1996; Farthing et al, 1995, 1997; Hickman and Banister, 2007a)
- Work trip distances and times are shorter in areas of higher population density, higher employment density and greater land use mix (Frank and Pivo, 1994).
- Trip lengths are shorter in 'traditional urban settings'. Walking and, to a lesser degree, public transport mode share is also higher in 'traditional urban settings' (Ewing and Cervero, 2001).
- The use of public transport and walk / bike modes is more likely where commercial and non-residential uses are nearby (within 300 feet of residence). Also, walking, cycling and public transport mode shares are greater in locations where shops are located close to office buildings (Cervero, 1989).

(taken from www.plan4sustainabletravel.org)

3.2.8 Given the above, according to the Commission for Integrated Transport (CFIT), an initial basis for securing sustainable development in transport terms is the selection of a good site location where:

- Good accessibility is available, or can be developed, by sustainable modes to:
  - employment and other main facilities in the main towns or immediate vicinities;
  - a rail station or other public transport interchange where good services are available to other (larger) centres within the sub-region; and
  - community facilities within the development or the surrounding neighbourhood.
- Opportunities exist to:
  - promote the use of walking, cycling and public transport;
  - provide an attractive level of public transport service which does not depend on (additional) subsidy over the longer term; and
  - utilise and support existing public transport services and community facilities in the locality.

3.2.9 According to Inclusive Mobility (DfT, 2002) bus services should be within 400m of a development in order to be considered accessible - though without specific development sites, this level of analysis is not available at this stage. However, this section does give indication of public transport density and therefore potential for servicing.

3.3 On-Site Development Infrastructure

3.3.1 According to the Government publication, Building Sustainable Transport into New Developments (DfT, April 2008), *"the layout of a development has a significant impact on how people choose to travel."*

3.3.2 Indeed, a year before this document was issued, the benefits of good design on mode choice was recognised in the DfT publication Manual for Streets which sought to directly influence the layout of new residential development.

3.3.3 The Manual for Streets replaced the previous guidance (DB32 and the accompanying Places, Streets and Movement) that was focused on providing for the car. By comparison, Manual for Streets provided a new hierarchy for the provision of infrastructure within the development envelope (as summarised in Figure 3.2 below) which placed the needs of pedestrians and cyclists at the forefront of design.

Figure 3.2: Development-Envelope Design Hierarchy
(Source; Manual for Streets)

Consider first	Pedestrians
	Cyclists
↓	Public transport use
	Specialist service vehicles (e.g. emergency service vehicles, waste etc)
Consider last	Other motor traffic

3.3.4 In the above, it is acknowledged that the attractiveness of walking and cycling is not only influenced by distance but also the quality of the walking and cycling environment.

3.4 Assessment of the Sustainability of New Development

3.4.1 Sections 3.3 to 3.5 in the Stage 1 Report have identified that opportunities to serve new development by sustainable modes vary across the district of Mansfield. The following table lists the Local Plan developments and makes an assessment of the opportunities for sustainable-transport based upon the context identified.

3.4.2 Where developments co-incide with opportunities for sustainable travel, it is likely that the proportion of those travelling to / from employment (and other services and facilities) by car will be naturally lower than where such opportunities do not exist. However, this is not meant to imply that developments in other areas should not proceed. Rather it identifies which developments would need additional support through development specific measures such as bus services, cycle routes and / or the wider Travel Planning process. Site descriptions and locations can be referenced from Figures 2.1 and 2.2 and Appendix A.

Table 3.2: Opportunities for Sustainable Travel at each Local Plan site

Site Number	Comment
13	Off road cycle facilities available on A38 Stockwell Gate both towards and away from Mansfield town centre. Site is approximately 650-700m from the Town centre and train station, a distance suitable for walking or cycling. Bus services are provided along both A38 Stockwell Gate and Bancroft Road, given the proximity to Mansfield Town centre and the bus station, there are a total of 27 buses per hour in each direction along the two routes combined, including services; 1, 3, 6, 9.1/2/3, 10, 17, 90 and 140. This site should enable and encourage sustainable travel.
16	A signed on road cycle route exists along Littleworth towards the town centre, suitable crossings are provided across St. Peters Way. Site is approximately 700m from the town centre and train/bus station. Bus service 18 provides an hourly service along Littleworth and Baum's Lane. This site should enable and encourage travel by active modes.
23	Off road cycle facilities available on A38 Stockwell Gate both towards and away from Mansfield town centre. Site is less than 500m from the Town centre and train station, a distance suitable for walking or cycling. There are many bus services provided along A38 Stockwell Gate given the proximity to Mansfield Town centre and the bus station, including services; 1, 3, 9.1/2/3, 10, 17, 90 and 140. This site should enable and encourage sustainable travel.
27	Along Chesterfield Road towards Mansfield Town centre there are a combination of on-road and off-road cycle facilities. The site is over 3.5km from Mansfield Town centre which is not a suitable walking distance for most journeys. The route is served by 23, 23b, 53, N23 and 'Pronto' bus routes, these provide frequencies of at least every 30 minutes during the day to and from Mansfield. Other destinations include; Chesterfield, Sheffield and Shirebrook. Some bus stops along Chesterfield Road benefit from Real Time Information. Bus facilities, whilst provided, may require greater frequencies to encourage a greater proportion of sustainable travel.
28	The site is approximately 900m from Mansfield Town centre. There are off-road cycle facilities to the Town centre. There are 8 bus services an hour in each direction along Chesterfield Road, including services; 9, 10, 17, 23, 53 and 'Pronto'. Real Time Information is provided at some stops. The site should provide sustainable travel options for its users and is also within a reasonable walking distance of the rail station.
57	The site is 600m from Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.7km therefore cycling would be more likely than walking, however no specific cycle routes are identified along the most likely (quickest/shortest) route along with this the cycle map identifies a busy route through Mansfield Woodhouse. Bus service number 1 provides a 10 minute frequency along Vale Road, past the site. The site could provide sustainable travel options to and from Mansfield and other destinations in Nottinghamshire and beyond.
107	The site is 2km from Mansfield Town centre. Off-road cycle routes are provided on A38 Stockwell Gate but not on Hermitage Lane past the site. Hermitage Lane is served by bus service 3 with bus stops nearby, more services operate along Stockwell Gate where the nearest stop is less than 500m away, services include; 1, 3, 9.1/2/3, 10, 17, 90 and 140. This site has the potential to offer sustainable travel options to the town centre.
14	The site is around 1km from Mansfield Town centre, the bus station and train station. It would be possible to walk from this site and cycle routes (unmarked) are provided on residential streets with no through traffic. Bus routes would generally be provided by the numerous services operating along Stockwell Gate, including services; 1, 3, 9.1/2/3, 10, 17, 90 and 140. This site would provide several options for sustainable travel to Mansfield.
18	The site is 2.3km from Mansfield Town centre, cycling would be more realistic than

Site Number	Comment
	walking for the majority of people over this distance. To the south of the site there is the Timberland Trail which offers an off road route for cyclists towards Mansfield and then along Littleworth. The most direct on-road routes to Mansfield do not have specific cycle provision. Bus service 17 operates along Stuart Avenue, past the site, however the frequency is just one bus an hour. More services operate on Sherwood Hall Road typically down to 15 minute frequencies. The site should provide sustainable travel options for its users.
19	The site is approximately 1.7km from Mansfield Town Centre, it may be possible to walk from this site utilising Ravensdale Road and Bath Lane. There are occasional shared cycle facilities provided on the footpath along the Ravensdale Road and Bath Lane route. There are several bus services provided along Ravensdale Road with a frequency of at least 15 minutes, including services; 14, 15A, 16 and N15. The site is suitable to provide sustainable travel options by walking, cycling or bus.
26	From this site, it is 1.5km to Mansfield Town centre, it is possible to undertake this journey walking. There are two options to cycle to Mansfield, either along Chesterfield Road or the traffic clamed route along Broomhill Lane. Bus services are provided along both Chesterfield Road and Broomhill Lane, including services; 9, 10, 17, 23, 53 and 'Pronto'. This site can provide sustainable travel options.
64	It is 5km from this site to Mansfield Town Centre, too far for the majority of walk journeys. It is also approaching the limit at which cycling can be considered appropriate, despite off-road facilities provided over the whole route. Bus services to Rainworth operate at 15 minute frequencies. The site is beyond the limit for significant use of active modes to Mansfield however a frequent bus service exists.
108	Mansfield Town centre is approximately 2.5km from this site, just beyond walking distance. Off-road cycle facilities are provided along Southwell Road West and bus services with a 15 minute frequency are also provided, services include 27, 28 and 141. This site is suitable for providing sustainable travel options.
8	This site is 2.3km from Mansfield Town centre/bus and train station. This is just beyond walking distance but could be undertaken by cycle. There are several routes which have been traffic calmed and suitable for cyclists. The site also lies close to several schools and the Kings Mill Hospital. The nearest bus service (number 6) is provided along Armstrong Road operating at 15 minute intervals, additional services are available along either Brick Kiln Lane (number 17) or Westfield Lane (within 500m)(number 23). This site is suitable for providing sustainable travel options.
9	This site is 2.4km from Mansfield Town centre/bus and train station. This is just beyond walking distance but could be undertaken by cycle. There are several routes which have been traffic calmed and suitable for cyclists. The site also lies close to several schools and the Kings Mill Hospital. The nearest bus service is provided along Armstrong Road (number 6) operating at 15 minute intervals, additional services are available along Brick Kiln Lane (within 500m) (number 17). This site is suitable for providing sustainable travel options.
12	The site is approximately 1.5km from Mansfield Town centre and could provide walking and cycling routes along traffic calmed Bancroft Lane. Bus service number 6 operates along Bancroft Lane at 15 minute intervals. It is also possible to walk from this site to the A38 Sutton Road where a number of regular services operate throughout the day, including; 1, 3, 9.1/2/3, 10, 17, 90 and 140. This site provides options for sustainable travel.
17	It is 1.2km from this site to Mansfield Town centre, a distance which could be undertaken by walking. Newgate Lane is traffic calmed and identified as a suitable cycle route. Bus services 7, 14 and 15 operate along Newgate Lane and Sandy Lane. This site provides suitable sustainable travel alternatives.
20	This site is less than 1km from Mansfield Town centre and therefore is within a reasonable distance for walking and cycling. Bus services (7 and N28) operate along

Site Number	Comment
	Newgate Lane with 15 minute frequencies. This site provides sustainable travel opportunities.
21	This site is less than 1km from Mansfield Town centre and therefore is within a reasonable distance for walking and cycling. The nearest bus services operate from Woodhouse Road at frequencies of 10 minutes (including services; 1, 10, 11, 12). This site provides sustainable travel opportunities.
22	This site is 3km from Mansfield Town centre, too far for most walking trips but within a reasonable distance to cycle. No specific cycle routes are provided over the majority of the journey. The nearest bus routes operate along Sandlands Way and Clipstone Road West; 14, 15, 16 and 17, some of these services operate at 15 minute intervals. This site has the potential to provide some sustainable travel opportunities.
29	This site is less than 1km from Mansfield Town centre and therefore is within a reasonable distance for walking and cycling. Bus services (4, 14, 15, 16, 17 and N15) operate along Bath Lane with 15 minute frequencies. This site provides sustainable travel opportunities.
30	This site is 2.25km from Mansfield Town centre and is therefore too far for most walk journeys. It is possible to comfortably cycle this distance, but there is no specific cycle lane and no suitable likely alternative. Bus services are provided along the A60 at 30 minute intervals, services 11, 12 and N11. There may be a requirement to improve the availability and attractiveness of sustainable travel options from this site.
32	The site is located 3.4km from Mansfield Town centre and is therefore too far to walk. It is however, within cycle distance and there are a few routes available with off-road cycle lanes provided over most of the route. There are employment and retail opportunities also available around Oak Tree Lane. Bus services are provided on Bellamy Road (18 and 28) with 30 minute frequencies. This site is suitable for sustainable travel options.
34	From this site, it is 1.5km to Mansfield Town centre, it is possible to undertake this journey walking. There are two options to cycle to Mansfield, either along Chesterfield Road or the traffic calmed route along Broomhill Lane. Bus services are provided along both Chesterfield Road and Broomhill Lane, including services; 9, 10, 17, 23, 53 and 'Pronto'. This site can provide sustainable travel options.
44	A signed on road cycle route exists along Littleworth towards the town centre, suitable crossings are provided across St. Peters Way. Site is less than 1km from the town centre and train/bus station and is suitable for both walking and cycling. Bus service 18 provides an hourly service along Littleworth and Baum's Lane. This site should enable and encourage travel by active modes.
50	The site is 2.7km from Mansfield Town centre, this is too far to walk for most journeys. There are opportunities to cycle along Eakring Road or the Timberland Trail towards Mansfield. Bus services are provided on Violet Hill (17) or Clipstone Road West (14 and 15) with frequencies of at least every 15 minutes. There are opportunities for sustainable travel from this site.
56	The site is less than 1km from the Town centre and therefore walking and cycling should be possible. There are no cycle lanes provided from this site. Bus services are provided on Rosemary Street (mostly via service 10). This site should enable and encourage travel by active modes.
100	This site is approximately 5km from Mansfield Town centre, too far to walk and at the upper limit for the majority of cyclist trips. Bus services 14 and 15 serve this area and operate at 30 minute frequencies. There may be a requirement to improve the availability and attractiveness of sustainable travel options from this site.
109	This site is 3km from Mansfield Town centre, too far for most walking trips but within a reasonable distance to cycle. No specific cycle routes are provided over the majority of the journey. The nearest bus routes operate along Sandlands Way (services 4 and 17) and Clipstone Road West (14, 15 and 16), some of these services operate at 15 minute intervals. This site has the potential to provide some sustainable travel opportunities.

Site Number	Comment
25	This site is just under 9km from Mansfield travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Bus services 9 and 12 pass the site entrance and operate on 30 minute service frequencies. However, not all journeys to/from this site would be to Mansfield, but would instead go to Market Warsop. This would allow a certain amount of sustainable travel from this site where Market Warsop could provide the required facilities.
91	This site is just under 9km from Mansfield travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Bus services 9 and 12 pass the site entrance and operate on 30 minute service frequencies. However, not all journeys to/from this site would be to Mansfield, but would instead go to Market Warsop. This would allow a certain amount of sustainable travel from this site where Market Warsop could provide the required facilities.
1	This site is approximately 8.5km from Mansfield Town centre travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Bus services 9, 10, 11 and 12 pass close to the site two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. Whilst large scale travel via the active modes is unrealistic, bus services could provide some sustainable transport to this site. However, not all journeys to/from this site would be to Mansfield, but would instead go to Market Warsop. This would allow a certain amount of sustainable travel from this site where Market Warsop could provide the required facilities.
2	This site is approximately 8.5km from Mansfield travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Only bus service 10 passes by this site entrance, with services every 60 minutes. Other services are available in Market Warsop, approximately a 1km walk. Utilising facilities in Market Warsop instead would allow a certain amount of sustainable travel from this site where possible.
3	This site is approximately 8.5km from Mansfield travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Only bus service 10 passes by this site entrance, with services every 60 minutes. Other services are available in Market Warsop, approximately a 1km walk. Utilising facilities in Market Warsop instead would allow a certain amount of sustainable travel from this site where possible.
63	It is approximately 3.5km to Mansfield Town centre from this site, too far to walk but could be an appropriate distance to cycle. There is an off-road cycle route (away from the highway) available to the south of the site, accessed from Jubilee Way and an alternative route via Eakring Road is also available. Bus routes 7, 17, 18 and N28 are available from the junction of Jubilee Way and Eakring Road, the frequencies of which are up to 15 minutes. This site is suitable for sustainable travel.
67	The site is just under 4km from Mansfield Town centre, a distance which is considered to be too far to walk for most people. This site is within cycling distance and off-road cycle provision is provided along the length of Southwell Road West. Bus services 27, 28 and 141 pass the site and have service frequencies of 15 minutes. As an employment site, most of the housing in the south east of Mansfield is easily accessible by sustainable travel modes.
68	The site is just under 4km from Mansfield Town centre, a distance which is considered to be too far to walk for most people. This site is within cycling distance and off-road cycle provision is provided along the length of Southwell Road West. Bus services 27, 28 and 141 pass the site and have service frequencies of 15 minutes. As an employment site, most of the housing in the south east of Mansfield is easily accessible by sustainable travel modes.
75	The site is just under 4km from Mansfield Town centre, a distance which is considered to be too far to walk for most people. This site is within cycling distance and off-road cycle provision is provided along the length of Southwell Road West. Bus services 27, 28 and 141 pass the site and have service frequencies of 15 minutes. As an employment site, most of the housing in the south east of Mansfield is easily accessible by sustainable

Site Number	Comment
	travel modes.
96	The site is just under 4km from Mansfield Town centre, a distance which is considered to be too far to walk for most people. This site is within cycling distance and off-road cycle provision is provided along the length of Southwell Road West. Bus services 27, 28 and 141 pass the site and have service frequencies of 15 minutes. As an employment site, most of the housing in the south east of Mansfield is easily accessible by sustainable travel modes.
98	This site is approximately 8.5km from Mansfield Town centre travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Bus services 9, 10, 11 and 12 pass close to the site two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. Whilst large scale travel via the active modes is unrealistic, bus services could provide some sustainable transport to this site. As an employment site it is possible to attract journeys from within Warsop where the possibility of sustainable travel would be greater than those travelling further. Some of the housing provided at Mansfield Woodhouse is approximately 4km away which may also allow the potential for some sustainable travel.
74	This site is approximately 8.5km from Mansfield travelling via the A60. This is too far to undertake walking and also too far for most cycle trips. Only bus service 10 passes by this site entrance, with services every 60 minutes. Other services are available in Market Warsop, approximately a 1km walk. On this basis this site currently provides little scope for sustainable travel. As an employment site it is possible to attract journeys from within Warsop where the possibility of sustainable travel would be greater than for those travelling further. Some of the housing provided at Mansfield Woodhouse is approximately 4km away which may also allow the potential for some sustainable travel.
97	The site is adjacent to the Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.7km therefore cycling would be more likely than walking, however only a short section of specific cycle route are identified along the most likely (quickest/shortest) route. Bus service number 1 provides a 10 minute frequency along Vale Road, closest to the site, there are other routes available on Debdale Lane. The site could provide sustainable travel options to and from Mansfield and other destinations in Nottinghamshire and beyond.
111	The site is located 3.4km from Mansfield Town centre. However, this site is a neighbourhood parade with the intention to provide conveniences to the local community. As a neighbourhood parade there are many residences to the south of Mansfield which are easily accessible by walking and cycling. This site is suitable for sustainable travel options given its purpose and likely catchment.
80	Portland Gateway is a mixed use development site which is located less than 1km from Mansfield Town centre, therefore it should be accessible for both walking and cycling. Off road (away from the highway) walk and cycle routes are provided along the river, also routes alongside Nottingham Road are provided. There are currently no bus routes provided along Quarry Lane but they are available along the A60 Portland Street (services 18, 19 and 'Pronto'). For the employment elements of the site, housing located to the west of Mansfield is accessible by sustainable travel modes.
81	Stockwell Gate is located within the A6009 and is therefore accessible from and forms part of the town centre. Access to this site is determined by access to Mansfield in general. The bus station and train station are located close by, therefore this site can be determined to be accessible by sustainable travel modes for all services terminating or calling at Mansfield.
82	White Hart is located within the A6009 and is therefore accessible from and forms part of the town centre. Access to this site is determined by access to Mansfield in general. The bus station and train station are located close by, therefore this site can be determined to

Site Number	Comment
	be accessible by sustainable travel modes for all services terminating or calling at Mansfield.
83	A signed on road cycle route exists along Littleworth towards the town centre, suitable crossings are provided across St. Peters Way. Site is approximately 700m from the town centre and train/bus station. Bus service 18 provides an hourly service along Littleworth and Baum's Lane. This site should enable and encourage travel by active modes.
84	This site lies just to the south of the A6009 but is accessible from the bus and train station, there are also recognised cycle routes around the site. This site provides sustainable transport options and has access to all services terminating or calling at Mansfield.
85	This site is located within the A6009 and is therefore accessible from and forms part of the town centre. Access to this site is determined by access to Mansfield in general. The bus station and train station are located close by, therefore this site can be determined to be accessible by sustainable travel modes. There are limited cycle facilities approaching this site.
99	This site is located within the A6009 and is therefore accessible from and forms part of the town centre. Access to this site is determined by access to Mansfield in general. The bus station and train station are located close by, therefore this site can be determined to be accessible by sustainable travel modes. There are limited cycle facilities approaching this site.
87	The site is 600m from Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.6km therefore cycling would be more likely than walking, however no specific cycle routes are identified along the most likely (quickest/shortest) route along with this the cycle map identifies a busy route through Mansfield Woodhouse. Bus service numbers 1, 4, 9 and 10 provide at least a 10 minute frequency past the site. The site could provide sustainable travel options to and from Mansfield and other destinations in Nottinghamshire and beyond.
88	The site is approximately 1km from Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.6km therefore cycling would be more likely than walking, however no specific cycle routes are identified along the most likely (quickest/shortest) route along with this the cycle map identifies a busy route through Mansfield Woodhouse. Bus service numbers 1, 4, 9 and 10 provide at least a 10 minute frequency past the site. The site could provide sustainable travel options to and from Mansfield and other destinations in Nottinghamshire and beyond.
93	The site is approximately 1km from Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.3km therefore cycling would be more likely than walking, however no specific cycle routes are identified along the most likely (quickest/shortest) route. Bus service numbers 1, 4, 9 and 10 provide at least a 10 minute frequency in close proximity to the site. The site could provide sustainable travel options to and from Mansfield and other destinations in Nottinghamshire and beyond.
110	The site is approximately 1km from Mansfield Woodhouse train station which provides services to Mansfield (3 minutes) at frequencies varying from half hourly to hourly. Other major destinations include Nottingham (40 minutes) and Worksop (30 minutes). The distance to Mansfield is 2.3km therefore cycling would be more likely than walking, however no specific cycle routes are identified along the most likely (quickest/shortest) route. Bus service numbers 1, 4, 9 and 10 provide at least a 10 minute frequency past the site. The site could provide sustainable travel options to and from Mansfield and other

Site Number	Comment
	destinations in Nottinghamshire and beyond.
89	This site is located in Market Warsop, primarily to serve the local community. The local community is generally within a 1km radius and therefore this site is accessible by walking and cycling. Bus services 9, 10, 11 and 12 pass close to the site, two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. This site is approximately 8.5km from Mansfield Town centre travelling via the A60 for access further afield.
94	This site is located in Market Warsop, primarily to serve the local community. The local community is generally within a 1km radius and therefore this site is accessible by walking and cycling. Bus services 9, 10, 11 and 12 pass close to the site, two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. This site is approximately 8.5km from Mansfield Town centre travelling via the A60 for access further afield.
95	This site is located in Market Warsop, primarily to serve the local community. The local community is generally within a 1km radius and therefore this site is accessible by walking and cycling. Bus services 9, 10, 11 and 12 pass close to the site, two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. This site is approximately 8.5km from Mansfield Town centre travelling via the A60 for access further afield.
106	This site is located in Market Warsop, primarily to serve the local community. The local community is generally within a 1km radius and therefore this site is accessible by walking and cycling. Bus services 9, 10, 11 and 12 pass close to the site, two of which operate at 30 minute service frequencies and two at 60 minute service frequencies. This site is approximately 8.5km from Mansfield Town centre travelling via the A60 for access further afield.

4 SUMMARY

4.1.1 This Stage 2 report has considered the highway related impacts of implementing the Local Plan development scenario for Mansfield District. The highway network, using the Mansfield SATURN traffic model has considered traffic volumes and capacities, delays on links and at junctions and travel times through the network.

4.1.2 The Local Plan represents an increase over the Reference Case of 1,134 trips in the AM Peak (3.3%) and 1,530 in the PM Peak (4.2%).

4.1.3 Highway traffic volumes have been considered in Section 2.5. Several links were identified to have traffic volume flow increases in the ranges of 10-30% increase and greater than 30% increase compared with the Reference Case. Assessing the current highway conditions on these links, i.e. parking obstructions, capacity restraints or access arrangements, in light of overall expected two-way traffic volumes in the Local Plan scenario, most of the highlighted links would operate within their assessed capacity. Links which may need further mitigation are; Skerry Hill (possible parking revisions), Quarry Lane (two pinch points), Leeming Lane North (high predicted flow volumes) and A6075 Warsop Road (possible parking revisions).

4.1.4 Section 2.6 considered link delay, as calculated using the SATURN traffic model and which included the queuing-delay on the approach to the junctions at the end of each link. The most significant link delays in the Local Plan scenario, as compared to the Reference Case, are predicted to occur along A60 Leeming Lane North, A6191 Chesterfield Road North, A6117 Oak Tree Lane and B6030 Sherwood Hall Road.

4.1.5 Over capacity was considered both in terms of links and junctions and detailed in Section 2.7. The junctions highlighted by the SATURN model were assessed in more detail using junction-specific analysis software; the results of which are reported in Appendix B at the back of this report. The following junction operational performances and mitigation measures were identified:

Table 4.1: Junction Mitigation Strategies

Junction	Within Capacity in…			Mitigation Measures
	Base	RC	LP	
Chesterfield Road / Debdale Lane	x	x	x	Likely to require additional land take, funding could be sourced from identified developments.
A60 Nottingham Road / Berry Hill Lane	✓	x	x	To improve overall efficiency MOVA control can be installed (£40k-100k). A GPS based system for additional improvements for public service vehicles (£4k-5k).
Carter Ln / Southwell Rd / Windsor Rd	✓	✓	x	Nearside crossing detection (low cost). An additional inbound lane, but with no obvious source (development site) for funding.
A60 Leeming Lane / New Mill Lane	✓	x	x	Widen new Mill Lane, significant funding would be required from identified development sites. This junction forms part of a bus priority scheme. GPS based system for additional improvements for public service vehicles (£4k-5k).
A617 MARR / A6191 Southwell Road	✓	✓	✓	No mitigation required. It is noted that funding has been secured for a Reference Case improvement.
A60 Leeming Lane / Peafield Lane	✓	✓	✓	No mitigation required. Would most likely require land take for further improvements.
A38 Sutton Road / Skegby Lane	✓	✓	x	MOVA control could be installed (£40k-100k). Further intervention may require land take and localised widening which could be funded from identified developments.
A60 Church Street / Wood Street	✓	x	x	MOVA control in the RC may improve efficiency (£40-100k). High cost options include further widening or the provision of a bypass.
A60 Leeming Lane / A6075 Warsop Road	-	-	x	Nottinghamshire County Council plan for a traffic signal junction with provision for the wider A60 bus priority scheme.

4.1.6 Journey time on defined routes were assessed with the SATURN model, and section 2.10 reports the impact of the Local Plan traffic growth on the network upon bus service operating times. The increases in journey times for bus operators can be mitigated against with the provision of bus priority corridors, such as that proposed for the A60. Additionally, GPS-based systems can be used to track bus positions and used by traffic signal controllers to optimise green signals in favour of the bus demands on the approaches to signalled junctions.

4.1.7 Section 3.0 has assessed the suitability of each Local Plan development site regarding the opportunities for sustainable transport. Many Local Plan sites are in favourable locations which are either close to Mansfield centre and therefore also the bus and train station for further destinations, or are located near to Market Warsop District Centre, or are located near to good quality / high frequency public transport corridors. Some sites are located further from these provisions where additional provision may be required to maximise the sustainability of the site.

5 CONCLUSIONS

5.1.1 Mansfield District Council is currently preparing a new Local Plan. This report has been prepared to support the traffic analysis and impacts of the developments in the Local Plan and considers the transport context within which the development sites identified within the development plan would be brought forward.

5.1.2 Baseline (2012) and Reference Case conditions have been assessed and reported in the Stage 1 report (Mansfield District Transport Study: Stage 1 Baseline and Reference Case, October 2014).

5.1.3 There is an existing traffic model of Mansfield, based upon the SATURN software package, which has been utilised in this study. The model has been updated to 2012 flow levels using existing and new traffic count data in order to represent a baseline of trip patterns and traffic volumes in Mansfield.

5.1.4 The 2012 Baseline and 2031 Reference Case traffic forecast models were used to examine the performance of the highway network and identify any junctions that were approaching capacity and thus causing delays and congestion. This process identified the following junctions:

- Chesterfield Road / Debdale Lane;
- A60 Nottingham Road / Berry Hill Lane;
- Carter Lane / Southwell Road/Windsor Road;
- A60 Leeming Lane / New Mill Lane;
- A617 MARR / A6191 Southwell Road;
- A60 Leeming Lane / Peafield Lane; and
- A38 Sutton Road / Skegby Lane.

5.1.5 Within Market Warsop the following junction was identified:

- A60 Church Street / Wood Street.

5.1.6 A list of 'urban concentration' development sites was compiled. These were used to generate additional trip demand matrices that were added to the 2031 Reference Case forecasts. The resulting 2031 Local Plan forecasts were assigned to the highway network, with improvements associated with committed developments.

5.1.7 The junction of A60 Leeming Lane / A6075 Warsop Road was also identified as requiring further assessment, detailed analysis confirmed that this junction was likely to be over capacity in the Local Plan growth scenario and that mitigation would be required.

5.1.8 Detailed models of the above junctions were built to examine their performance in the Base Year, Reference Case and Local Plan.

5.1.9 An assessment and review of the sustainable travel potential of each Local Plan site has been undertaken to identify sites that may require additional interventions to maximise the take up of sustainable travel options.

GLOSSARY

ARCADY	*Assessment of Roundabout Capacity and DelaY*. A software tool used to assess the capacity of roundabouts under differing traffic scenarios.
Design Manual for Roads and Bridges	The UK highway design guide, commonly used for analysis and design of the trunk road network but also used for local roads, where appropriate.
Degree of Saturation (DoS)	A measure of the operational performance of a signalled junction, with measures 100% or above indicating that a junction is operating above capacity.
Guidance on Transport Assessment (GTA)	A guidance document prepared by the DfT setting out how a Transport Assessment should be prepared.
Junction Capacity	The number of vehicles which can be accommodated by a junction within a given period. Normally calculated using software such as ARCADY, PICADY or LINSIG. Where a junction is operating “at capacity”, queues are likely to form since the number of vehicles approaching the junction is more than that which can pass through it.
LINSIG	A computer programme used for modelling traffic at traffic signal junctions. LINSIG allows engineers to model junctions in a way which closely follows the behaviour of on-site signal control equipment.
Local Highway Authority	The body responsible for the local road network in a particular area, in particular with regards network improvements and the control of development that could affect the local highway.
Local Plan	A document produced by Local Authorities containing the development plans and policy documents for the local area.
Local Transport Plan	The Transport Act 2000 required Local Highway Authorities to produce and maintain an LTP. The LTP sets out transport strategies and policies for a given area and how these will be implemented. The plans cover a defined period and are used by the DfT to make decisions on capital funding, and for Local Authorities to monitor the delivery of key

	objectives and targets. The current LTP document covers the period 2011- 2026.
Manual Classified Count (MCC)	A count of traffic on a particular road, or at a junction, which is usually undertaken by a team of enumerators, usually over a 12-hour period. Traffic is classified by vehicle type.
MOVA	*Microprocessor Optimised Vehicle Actuation* is an adaptive signal control system. It uses advanced traffic control algorithms to increase capacity and minimise delay at traffic signals. It is used at a range of junctions from high speed to smaller suburban and urban sites.
NTEM	The *National Trip End Model* is a transport planning tool that was developed by the DfT, which produces projections of trip numbers across England and Wales. The forecasts are derived from local and regional planning projections of jobs, employment, population and household numbers in combination with travel growth factors from the national transport model.
PCU	Passenger Car Units are used to measure the capacity of roads and junctions whereby vehicle flows are converted to a standard unit using factors, e.g. car = 1 PCU, bus = 2 PCUs.
PICADY	*Priority Intersection Capacity and Delay.* A software tool that predicts capacities, queue lengths and delays at non-signalised major/minor priority junctions.
Ratio of Flow to Capacity (RFC)	A measure of the performance of a junction, with a measure of 1.0 or above indicating that a junction is operating above capacity.
SATURN	A software tool used to model traffic flows on a highway network that is responsive to congestion and reassignment issues.
TEMPRO	Is the software used to calculate and present NTEM trip growth factors for defined local areas.
Transport Analysis Guidance (TAG)	A set of documents (or Units) published by the Department for Transport which sets out how a particular transport scheme should be assessed, principally in terms of economic analysis and calculating a Benefit:Cost ratio. Guidance on the assessment of environmental impacts of highway

	schemes are also contained in the guidance. Sometimes referred to as WebTAG.
Transport Assessment (TA)	A document submitted in support of a planning application which sets out the likely impact of a proposed development on the transport network. Guidance on the content of a Transport Assessment is provided in the GTA.
Travel Plan	A document submitted in support of a planning application which sets out how trips to / from a development would be managed on opening. Its objective is usually to reduce single occupancy car trips by promoting sustainable travel options.
Trip Rate Information Computer System (TRICS)	A software tool which contains traffic survey data classified by land-use type and size. It is used to estimate the number of trips that could be generated by a proposed development based on experience elsewhere in the UK, and is recommended for this purpose in the GTA.
Trip Assignment	A stage in the estimation of future traffic conditions. The process of "assigning" traffic flows to particular links and junctions to and from a particular destination. It is preceded by Trip Distribution.
Trip Distribution	A stage in the estimation of future traffic conditions. The process of determining the likely origins and destinations of traffic to and from a proposed development. This stage does not make any assumptions about routeing, and is followed by Trip Assignment.
Trip End Model Program (TEMPRO)	The TEMPRO database contains information relating to land-use developments across the United Kingdom. It is used to forecast traffic growth in / from specific areas.
Trip Generation	A stage in the estimation of future traffic conditions. Trip Generation is an estimate of the total arrivals and departures that could be generated by a development within a specific time period. The software tool TRICS is commonly used to inform this stage. This stage is followed by Trip Distribution and Trip Assignment.
WebTAG	See TAG.

APPENDIX A
Local Plan Development Sites

Central Area Sites

			Floorspace (GIA) where known						Additional Local Plan Two Way Trips	
Site No.	Name	Site Area	Retail	Business	Leisure	Car Parking	Mixed Use	Residential	AM	PM
80 (Edge of centre)	Portland Gateway	80(a) 0.9ha 5,800 sqm? Both stated within the masterplan doc 0.63 ha	-	-	-	Parking for 250 cars (shoppers and workers) We've calculated this to be approx. 5000 sqm	-	-	0	0
80 (Out of centre)	Portland Gateway (made up of three sites)	**Site 1** – 80(b) 1.6ha 16,000 sqm 1.66 ha	-	-	-	-	-	Improvement to existing housing (homezone)	0	0
		Site 2 – 80(c) 4.5ha 44,000 sqm? Both stated within the masterplan doc 4.54 ha	-	1no. storey 3 Office buildings @ 600m2 GIA per floor 2no. 3 storey Office building @ 850m2 per floor **Total 6900m2** 2no. 2 storey Hybrid Unit @ 300m2 GIA per Floor 2no. 2 storey Hybrid Unit @ 600m2 GIA per Floor	-	Parking for approx 312 cars	-	-	155	131

				Total 3600m2 1no. 1 storey Warehouse building @ 1100m2 per floor 3no. storey 1 Warehouse buildings @ 600m2 GIA per floor **Total 2900m2**						
		Site 3 – 80(d) 2.2ha 21,000 sqm? Both stated within the masterplan doc 2.1 ha	-	**-**	2no. small all weather 5-a-side football pitches @ 1280m2 1no. small all weather 5-a-side football pitches @ 2700m2 **Total 5380m2** 1no. indoor leisure facility and complimentary commercial facilities @ 3790m2 GIA **Total 3790m2**	Parking for approx 76 cars and 9 coaches	-	-	44	61
81	SGN	2.46 ha	15,000 sqm net sales area	-	-	-	1,550 sqm net (potential for A2/A3/A4/A5/C1/D2)	-	403	906
82	White Hart	3.62 ha	2775 sqm net sales area	5,318 sqm GIA?	1,116 sqm net	-	-	144 dwellings	228	302

83	Brewery	1.36 ha	-	8,000 sqm	-	-	-	-	122	103
84	Riverside (made up of three areas)	**Site 1** – 84(a) 0.5 ha	-	-	Hotel 3,200 sqm (80 beds) Café 750 sqm	Multi-storey car park 13,500 sqm	-	-	26	60
		Site 2 – 84(b) 1.66 ha	-	3,336 sqm (GIA?) (new police accommodation)	-	Secure decked car park 5,670 sqm	9,732 sqm (C3/B1a/A1)	-	128	214
		Site 3 – 84(c) 0.9 ha	-	9,000 sqm	-	-	-	-	137	116
85	Clumber Street	0.2 ha	1,000 sqm net sales area	-	-	-	1,000 sqm (upper storey, potential for A2/A3/A5/B1a/C3)	-	28	71
99	Toothill Lane	0.19 ha	480 sqm net sales area	-	-	-	480 sqm (upper storey, potential for A2/A3/B1a/C3)	-	14	34

Mansfield Woodhouse District Centre Sites

			Floorspace (GIA) where known						Additional Local Plan Two Way Trips	
Site No.	Name	Site Area	Retail	Business	Leisure	Car Parking	Mixed Use	Residential	AM	PM
87	Land off Vale Road	0.04 ha	300 sqm net	-	-	-	-	-	7	15
88	Land Adj The Greyhound PH	0.04 ha	-	-	-	-	375 sqm net (potential for A1/A3)	-	4	18
93	Car Park Adj Morrisons supermarket	0.2 ha	1,250 sqm net	-	-	-	-	-	28	64
110	Mansfield Woodhouse Police Station	0.10 ha	750 sqm net	-	-	-	-	-	17	39

Market Warsop District Centre Sites

			Floorspace (GIA) where known						Additional Local Plan Two Way Trips	
Site No.	Name	Site Area	Retail	Business	Leisure	Car Parking	Mixed Use	Residential	AM	PM
89	Land Adj Crates and Grapes PH	0.08 ha	-	-	-	630 sqm	200 sqm net (potential for A1/A3)	-	2	10
94	Car Park off A60	0.04 ha	300 sqm net	-	-	-	-	-	7	15
95	Library and Adj Car Park	0.12 ha	1,000 sqm net	-	320 sqm net	-	-	-	23	51
106	The Former Strand Bingo Hall and Adj Builders Yard	0.64 ha	-	-	-	-	5000 sqm net (potential for A1/A2/A3/A4/A5/ C1/D2/Car Park	-	197	412

Bellamy Road Neighbourhood Parade (new build)

			Floorspace (GIA) where known						Additional Local Plan Two Way Trips	
Site No.	Name	Site Area	Retail	Business	Leisure	Car Parking	Mixed Use	Residential	AM	PM
111	Bellamy Road Neighbourhood Parade	0.49 ha	1,076 sqm net	-	-	1,500 sqm (approx.)	-	-	24	55

Suggested Housing Allocation

Mansfield

Greenfield / PDL	Site No.	Site Name	Owner (where known)	Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan 2 way Trips AM	PM
PDL	13	Employment Land off Spencer Street	Private	C3	0.68	50	25	27
PDL	16	Former Mansfield Brewery (East)	Private	C3	1.27	80	40	43
PDL	23	Former Centre for the Disabled	NCC	C3	0.41	50	25	27
PDL	27	Pleasley Regeneration Area	MDC	C3	4.54	150	76	80
PDL	28	Civic Centre, Car Park and Part of Recreation Ground	MDC	C3	3.2	96	48	51
PDL	57	Vale Road Housing Repairs Depot	MDC	C3	1.22	37	19	20
PDL	107	Hermitage Mill		C3	1.05	32	16	17
			Total	**7**	**12.37**	**495**		
Mixed	14	Victoria Court Flats & Moor Lane Recreation Ground	MDC	C3	2.1	53	27	28
Mixed	18	Former Sherwood Hall School	NCC	C3	5.64	169	85	90
Mixed	19	Former Ravensdale Middle School	NCC	C3	3.67	110	55	59
Mixed	26	Bould Street / Brownlow Road Regeneration Area	MDC	C3	3.09	93	47	50
Mixed	64	Railside Helmsley Road	Private	C3	2.07	62	31	33
Mixed	108	Rear of Bannatynes		C3	1.05	32	16	17
			Total	**6**	**17.62**	**519**		
Greenfield	8	Rosebrook Primary School Playing Fields	NCC	C3	2.58	77	39	41
Greenfield	9	Land Adj Former Cycling Proficiency Site	MDC	C3	2.66	80	40	43
Greenfield	12	Kirkland Avenue Allotments	Trustees for the Labouring Poor	C3	6.19	186	94	100
Greenfield	17	Sandy Lane Open space/ Allotments	MDC & NCC	C3	5.01	150	0	0
Greenfield	20	Land adjacent Newgate Lane Primary and Sandy Bank Nursery School	NCC	C3	0.78	23	12	12
Greenfield	21	Former MDC Nursery	MDC	C3	1.27	38	0	0
Greenfield	22	Flint Avenue Open Space	MDC	C3	1.4	16	8	9
Greenfield	29	Sandy Lane Playing Fields	MDC	C3	1.3	39	20	21
Greenfield	30	Leeming Lane South Open Space	MDC	C3	0.7	21	11	11
Greenfield	32	Bellamy Road Recreation Ground	MDC	C3	2.14	64	32	34

Mansfield

Greenfield / PDL	Site No.	Site Name	Owner (where known)	Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan 2 way Trips AM	PM
Greenfield	34	Broomhill Lane Allotments	Trustees for the Labouring Poor	C3	0.94	30	15	16
Greenfield	44	Land at Littleworth	NCC	C3	0.6	18	9	10
Greenfield	50	Pump Hollow Road Allotments	Welbeck Estates	C3	1.9	57	29	30
Greenfield	56	Westfield Lane Open Space	NCC	C3	1.11	33	17	18
Greenfield	100	Clipstone Wellfare	Private	C3	1.67	38	19	20
Greenfield	109	The Bridleway		C3	0.86	26	13	14
			Total	**16**	**31.11**	**896**		
			Total	**29**	**61.1**	**1910**		

Warsop Parish

Greenfield / PDL	Site No.	Site Name	Owner (where known)	Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan 2 way Trips AM	PM
PDL	25	Moorfields Farm	C/O Ian Baseley Associates	C3	0.57	17	0	0
			Total	**1**	**0.57**	**17**		
Mixed	91	Church Warsop Miners Welfare	Private	C3	1.05	32	16	17
			Total	**1**	**1.05**	**32**		
Greenfield	1	Ridgeway Terrace & Other Allotments	Welbeck Estates	C3	12.52	376	190	201
Greenfield	2	Sherwood Street	NCC	C3	1.21	36	18	19
Greenfield	3	Mount Pleasant Allotments	Welbeck Estates	C3	1.47	44	22	24
			Total	**3**	**15.2**	**456**		
			Total	**5**	**16.82**	**505**		
			Total	**34**	**77.92**	**2415**		

Suggested Employment Allocation

Mansfield

Greenfield / PDL	Site No.	Site Name	Owner (where known)	Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan2 way Trips AM	PM
Greenfield	63	Land at Eakring Road	Welbeck Estates	B1/B2/B8	3.3	0	95	79
Greenfield	67	Land to the North of Hawthorn House	Ransom Wood Estates	B1/B2/B8	2.2	0	40	33
Greenfield	68	Sherwood Oaks Business Park	Sandora	B1/B2/B8	5.26	0	95	79
Greenfield	75	Ransom Wood Business Park	Ransom Wood Estates	B1a	2.15	0	39	32
Greenfield	96	Land Fronting Southwell Road West	Ransom Wood Estates	B1a	2	0	36	30
			Total	**5**	**14.91**	**0**		
			Total	**5**	**14.91**	**0**		

Warsop Parish

Greenfield / PDL	Site No.	Site Name	Owner (where known)	Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan 2 way Trips AM	PM
PDL	98	Land at Former Market Warsop Station	Private	B1/B2	1.14	0	55	45
			Total	**1**	**1.14**	**0**		
Mixed	74	Land Adj Recycling Depot	Welbeck Estates	B1/B2	2	0	63	52
			Total	**1**	**2**	**0**		
			Total	**2**	**3.14**	**0**		
			Total	**7**	**18.05**	**0**		

Suggested Gypsy and Traveller Allocation

Mansfield

Greenfield / PDL	Site No.	Site Name	Owner (where known)		Use Class	Area (Ha)	Dwelling Capacity	Additional Local Plan 2 way Trips AM	PM
PDL	97	Former Marshalls	Private		C3	3.81	20	10	11
				Total	**1**	**3.81**	**20**		
				Total	**1**	**3.81**	**20**		
				Total	**1**	**3.81**	**20**		

Mansfield

Bellamy Road Neighbourhood Parade

Site No.	Site Name	Owner (where known)	GF/PDL	Proximity	Area(Ha)	Dwellings	Floorspace m2 (Where Known) Retail	Business	Leisure	Car Parking	Mixed Use	
111	Bellamy Road Neighbourhood parade	MDC	Greenfiel	In Centre	0.49	0	1076	0	0	1500	0	
				Total	**0.49**	**0**	**1076**	**0**	**0**	**1500**	**0**	

Mansfield Town Centre

Site No.	Site Name	Owner (where known)	GF/PDL	Proximity	Area(Ha)	Dwellings	Floorspace m2 (Where Known) Retail	Business	Leisure	Car Parking	Mixed Use	
80	Portland Gateway	Mixed	PDL	Out of Centre	8.30	0	0	13400	9170	5900	0	
80	Portland Gateway	Mixed	PDL	Edge of Centre	0.63	0	0	0	0	5000	0	
81	Stockwell Gate North	Mixed	PDL	In Centre	2.46	0	15000	0	0	0	1550	(A2/A3/A4/A5/C1/D2/CP)
82	White Hart	Mixed	PDL	In Centre	3.62	144	2775	5318	1116	0	0	
83	Former Mansfield Brewery	Private	PDL	Edge of Centre	1.36	0	0	8000	0	0	0	
84	Riverside	Private	Mixed	Edge of Centre	3.06	0	0	12336	3950	19170	9732	(C3/B1a/A1)
85	Clumber Street Infill Sites	Private	PDL	In Centre	0.20	0	1000	0	0	0	1000	(A3/A4/A5/B1a/C3)
99	Toothill Lane Infill Site	MDC	PDL	In Centre	0.19	0	0	0	0	0	800	(A1/A2/A3/C3)
				Total	**19.82**	**144**	**18775**	**39054**	**14236**	**30070**	**13082**	

Mansfield Woodhouse District Centre

Site No.	Site Name	Owner (where known)	GF/PDL	Proximity	Area(Ha)	Dwellings	Floorspace m2 (Where Known) Retail	Business	Leisure	Car Parking	Mixed Use	
87	Land off Vale Road	Private	PDL	Edge of Centre	0.04	0	300	0	0	0	0	
88	Land Adj The Greyhound PH	Private	PDL	In Centre	0.04	0	0	0	0	0	375	(A1/A3)
93	Carpark Adj Morrisons	Private	PDL	In Centre	0.13	0	1250	0	0	0	0	
110	Police Station	Notts Police	PDL	In Centre	0.10	0	750	0	0	0	0	
				Total	**0.31**	**0**	**2300**	**0**	**0**	**0**	**375**	

				Total	**20.62**	**144**	**22151**	**39054**	**14236**	**31570**	**13457**	

Warsop Parish

Market Warsop District Centre

Site No.	Site Name	Owner (where known)	GF/PDL	Proximity	Area(Ha)	Dwellings	Floorspace m2 (Where Known)					
							Retail	Business	Leisure	Car Parking	Mixed Use	
89	Land Adj Crates and Grapes PH	Private	PDL	In Centre	0.08	0	0	0	0	630	200	(A1/A3)
94	Carpark off A60	Private	PDL	In Centre	0.04	0	300	0	0	0	0	
95	Library and Adj Car Park	Mixed	PDL	In Centre	0.12	0	1000	0	320	0	0	
106	The Former Strand Bingo Hall and Adj Builders Yard	Private	PDL	Edge of Centre	0.64	0	0	0	0	0	5000	(A1/A2/A3/A4/A5/C1/D2/CP)
				Total	**0.88**	**0**	**1300**	**0**	**320**	**630**	**5200**	

				Total	**0.88**	**0**	**1300**	**0**	**320**	**630**	**5200**	

Please note... the 'Mixed Use' field contains information on all uses that would be acceptable, however it is possible that not all the uses detailed will come forward. Despite this, the figures given for Riverside (Site No. 84b) are based upon a masterplan document.

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APPENDIX B
Junction Operational Capacity Assessments
Reference Case (2031) and Local Plan (2031)

Appendix B

Introduction

This Appendix summarises the detailed Reference Case (2031) and Local Plan (2031) junction assessments described in the main body of the report.

LINSIG3 has been used to assess signalised junctions. LINSIG3 software provides outputs for both individual approaches and for the junction as a whole. For the individual approaches, the outputs are Degree of Saturation (DoS) and Mean Maximum Queue Length (MMQ). A total-junction statistic known as the Practical Reserve Capacity (PRC) is also reported, which shows the percentage of "spare" capacity left at the junction.

LINSIG works on the basis that a junction is considered to be near to or at capacity when the DoS value on an individual junction approach exceeds 90%. Below this threshold, queues begin to increase slowly as the DoS increases. Above this threshold, queues begin to elongate rapidly. As the DoS on any approach increases, the PRC remaining at the junction decreases.

ARCADY has been used to assess roundabout junctions. The ARCADY software has been run using a synthesised profile and provides outputs in the form of *Ratio of Flow to Capacity* (RFC) and *queue length* (Q). A synthesised profile includes a 12.5% mid-peak increase in traffic demand to robustly test the performance of the junction. For a new roundabout, a target RFC value of 0.85 on the worst-approach during a single time segment is preferred as this minimises the chance that queuing will occur at a new junction on opening. For existing junctions, RFC values above 0.85 are likely to produce queues which increase slowly. Above an RFC value of 1.0, a junction is more than likely to be at capacity (with resulting larger increases in queue length).

PICADY, has been used to assess priority junctions. For a new priority junction, a target RFC value of 0.85 on the worst-approach during a single time segment is preferred as this minimises the chance that queuing will occur at a new junction on opening. For existing junctions, RFC values above 0.85 are likely to produce queues which increase slowly. Above an RFC value of 1.0, a junction is more than likely to be at capacity (with resulting larger increases in queue length).

Chesterfield Road / Debdale Lane

This is a signalised junction and, as such, has been assessed using LINSIG3. Chesterfield Road is a key route between the M1 and Mansfield town centre. Abbott Road leads to local housing estates and links into MARR providing routes to Sutton in Ashfield and the A38. Debdale Lane provides routes to Mansfield Woodhouse.

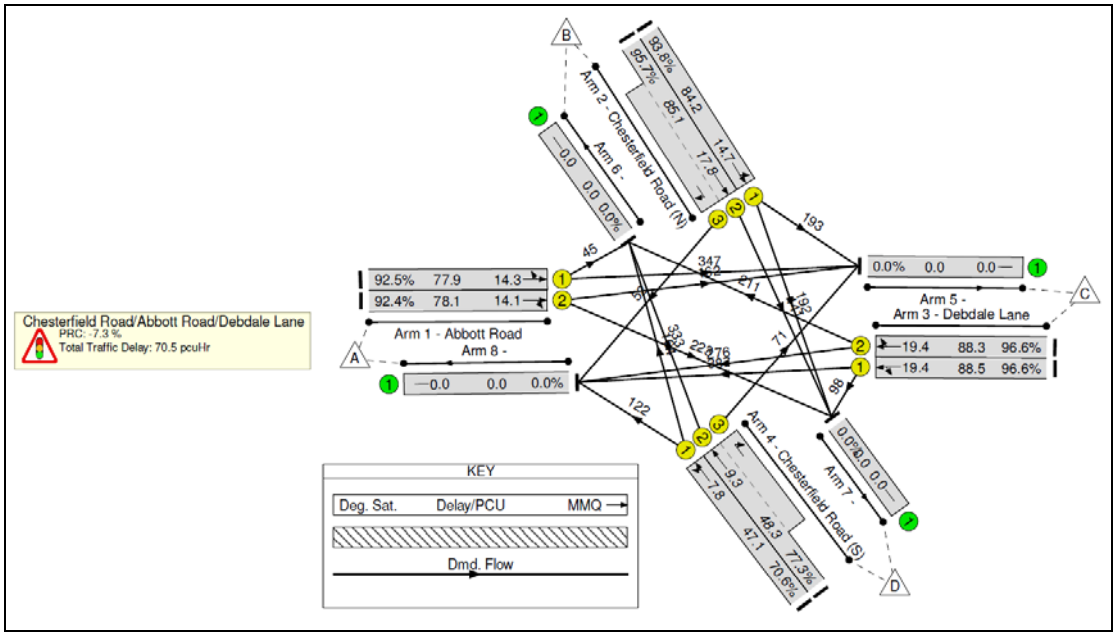


Table 1B: Performance of Chesterfield Road / Debdale Lane (Reference Case)

Approach	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Abbott Road Left Ahead	104.9%	27.6	128.5%	91.2
Abbott Road Ahead Right	105.1%	27.5	128.5%	89.2
Chesterfield Road (N) Left Ahead	102.2%	24.6	108.5%	35.3
Chesterfield Road (N) Ahead Right	102.6%	28.4	108.8%	42.9
Debdale Lane Left Ahead	105.4%	34.2	127.1%	79.0
Debdale Lane Ahead Right	105.6%	34.8	127.2%	78.8
Chesterfield Road (S) Left Ahead	73.9%	8.5	126.0%	72.7
Chesterfield Road (S) Ahead Right	80.1%	10.4	126.3%	97.6
Junction Summary	PRC	-17.4	PRC	-42.8
	Veh Delay (PCU Hrs)	144.81	Veh Delay (PCU Hrs)	526.94

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCUs etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU/hrs.

Operation of this junction in 2012 Base network was over capacity with an overall junction delay in the PM peak of 419 pcu-hours. The increased demand in the 2031 Reference Case results in this junction being further over capacity. All approaches, with the exception of Chesterfield Road (S), have a degree of saturation in excess of 100% in either the AM or PM peak hours or both. This means that in 2031 Reference Case, with committed developments in place, this junction would experience delays and queuing.

Localised widening could be undertaken, although any expansion is restrained by the petrol filling station, the public house and local businesses on three corners of the junction. Further capacity improvement will be difficult and/or expensive as it would require land take. A detailed design of junction options would need to be developed in order to assess the feasibility of any potential junction improvements and the impact upon adjacent land owners. Alternative solutions might seek to remove turning movements from the junction by banning turning movements and providing alternative diversion routes, however these are not endorsed by Nottinghamshire County Council and there is a possibility they may not be complied with.

The traffic related impacts upon this junction should be considered in light of the Committed Developments which are planned in the vicinity and are expected to have the greatest impacts. Final trip rates, vehicle routing patterns and the possibility for developer funding contributions should be considered in the Transport Assessment, where appropriate, and agreed with the Local Authority. The developments most likely to impact upon this junction are; Penniment Farm, Former Sherwood Colliery and Little Debdale Lane.

Table 1C: Performance of Chesterfield Road / Debdale Lane (Local Plan)

Approach	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Abbott Road Left Ahead	105.7%	29.0	136.5%	107.7
Abbott Road Ahead Right	105.8%	28.7	136.4%	104.9
Chesterfield Road (N) Left Ahead	109.7%	37.1	110.0%	40.2
Chesterfield Road (N) Ahead Right	110.1%	44.4	110.4%	49.1
Debdale Lane Left Ahead	105.8%	36.1	130.8%	87.3
Debdale Lane Ahead Right	105.8%	36.6	130.8%	87.3
Chesterfield Road (S) Left Ahead	85.4%	10.8	134.2%	95.9
Chesterfield Road (S) Ahead Right	89.1%	13.1	134.4%	127.6
Junction Summary	PRC	-22.4	PRC	-51.7
	Veh Delay (PCU Hrs)	183.14	Veh Delay (PCU Hrs)	638.13

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCUs etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU/hrs.

Adding Local Plan growth into the traffic model reveals that there is a slight worsening of junction performance at this location when compared to the Reference Case scenario. In the PM peak, Abbott Road approach increases from the Reference Case degree of saturation (DoS) of 128.5% to DoS of 136.5% with Local Plan growth. In the PM peak, vehicles delays would increase from 527 pcu-hours in the 2031 Reference Case to 638 pcu-hours with Local Plan growth, an increase of 21%.

In terms of PM peak hour junction delays, the existing junction operates at 419 pcu-hours, the Reference Case at 527 pcu-hours (+26%) and with Local Plan growth would operate at 638 pcu-hours (+52%). It is likely that any junction strategy, implemented to accommodate traffic impacts of growth in the Reference Case, could also be adapted to accommodate the further impact of the Local Plan developments.

This junction already operates on MOVA which adjusts phase timings depending upon demand, under MOVA control it is also possible to increase the overall cycle time to improve overall efficiency. It would be possible to implement near side detection for the pedestrian crossings which would reduce intergreen times currently lost to the pedestrian phase. A CCTV system could be implemented at this junction to manually intervene in response to queue formation. To meet both Reference Case and Local Plan growth it may be necessary to acquire land to provide localised widening. Additional space for queuing on A6075 to provide for two ahead movements and two ahead exits along with a lengthened facility for left turn flares would allow signal times to be re-optimised.

Local Plan sites which could be considered suitable for developer funding contributions for any major junction improvements are; Bould Street/Brownlow Road Regeneration Area, Civic Centre Car Park and part of Recreation Ground and Broomhill Lane Allotments.

A60 Nottingham Road / Berry Hill Lane

This is a signalised junction and, as such, has been assessed using LINSIG3. The A60 Nottingham Road is a key arterial route between Mansfield and Nottingham. Berry Hill Lane leads to local housing and provides a route for east-west movements across Mansfield. Atkin Lane links to local housing and business parks. There is a school located on the corner of Atkin Lane which leads to localised parking/capacity issues at peak times.

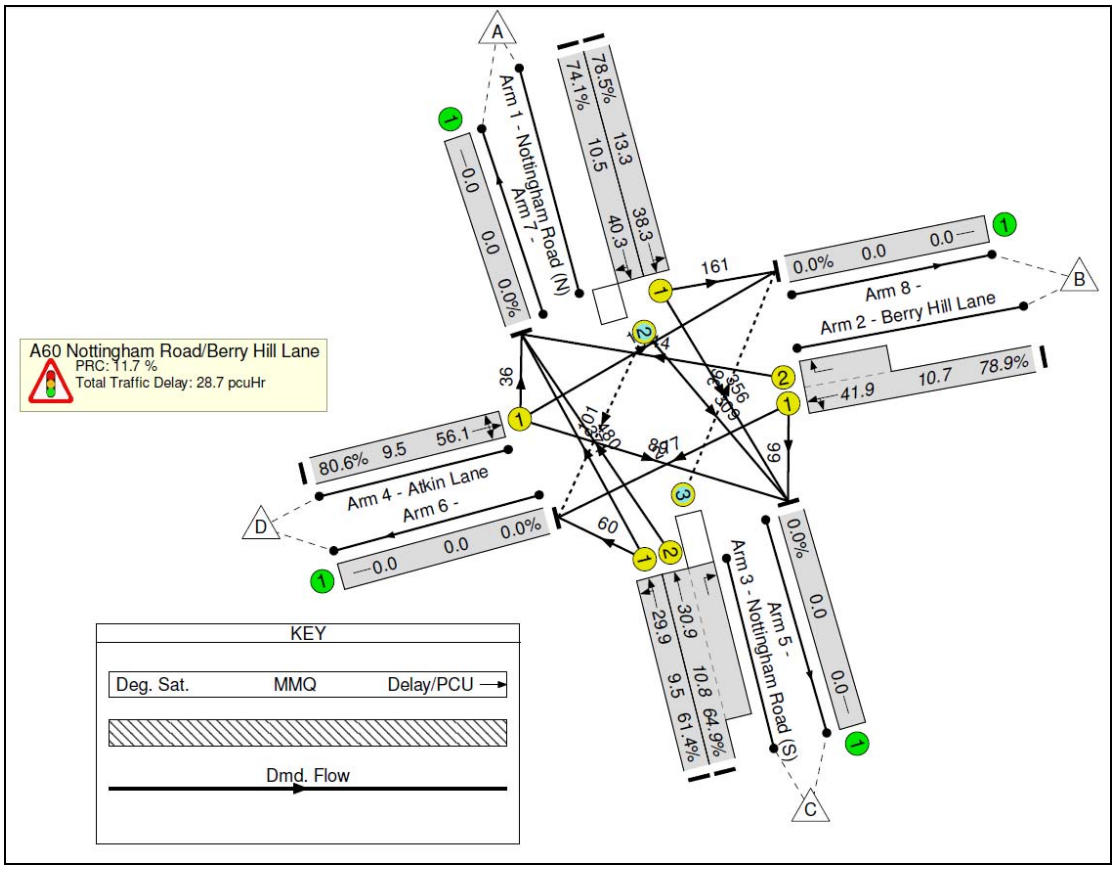

A60 Nottingham Road/Berry Hill Lane
PRC: 11.7 %
Total Traffic Delay: 28.7 pcuHr
A
B
C
D
Arm 1 - Nottingham Road (N)
Arm 7 -
Arm 8 -
Arm 2 - Berry Hill Lane
Arm 4 - Atkin Lane
Arm 6 -
Arm 3 - Nottingham Road (S)
Arm 5 -
78.5%
74.1%
13.3
10.5
38.3
40.3
0.0%
0.0
0.0
80.6%
9.5
56.1
41.9
10.7
78.9%
29.9
30.9
10.8
9.5
61.4%
64.9%
161
36
99
60
KEY
Deg. Sat.
MMQ
Delay/PCU
Dmd. Flow

Table 2B: Performance of A60 Nottingham Road / Berry Hill Lane (Reference Case)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Nottingham Road (N) Left Ahead	108.5%	57.9	94.2%	19.1
Nottingham Road (N) Ahead Right	104.6%	22.2	96.3%	21.8
Berry Hill Lane Left Ahead Right	110.3%	44.8	96.7%	18.4
Nottingham Road (S) Left Ahead	74.0%	13.3	84.9%	14.6
Nottingham Road (S) Ahead Right	78.3%	14.2	93.8%	20.6
Atkin Lane Left Ahead Right	111.3%	42.6	97.7%	22.0
Junction Summary	PRC	-23.7	PRC	-8.5
	Veh Delay (PCU Hrs)	147.72	Veh Delay (PCU Hrs)	69.05

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Whereas the junction is observed to operate within capacity under 2012 Base traffic demands, Table 2B above shows that the increased demand in the Reference Case scenario results in some approaches to the junction operating over capacity. Nottingham Road (N), Berry Hill Lane and Atkin Lane all have degrees of saturation in excess of 100% in the AM peak hour. Nottingham Road, Berry Hill Lane and Atkin Lane all have degrees of saturation in excess of the 90% target DoS in the PM peak.

This junction currently does not operate under MOVA control but this is an option for the Reference Case, the installation of MOVA typically costs in the range of £40,000 to £100,000 dependent upon existing conditions and equipment. The degree of saturation in the Reference Case AM peak hour indicates that, even after the optimisation of the signal timings, one or more arms would be over capacity, particularly in the AM peak hour.

Compact approaches to the junction (narrow lanes) and lack of adjacent land to use for widening of the carriageway would restrict the amount of physical mitigation that could be undertaken, for example in terms of further lane widening. It may be possible to examine the closure of some shared lane right turn movements to increase capacity for the ahead-movements, but liaison with Mansfield District Council and Nottinghamshire County Council determined that this solution would not be acceptable in terms of the routing of the displaced vehicles and is therefore discounted.

If a more significant scheme is therefore required, i.e. including land take, the funding for such works could be partially sourced from nearby Committed Development schemes which would be expected to have an impact at this location. The following developments are most likely to impact this junction; Lindhurst, Former Evans Halshaw – Nottingham Road, Former Mansfield Sand Company, Kings Walk – Berry Hill Quarry and Berry Hill Hall. The relevant Transport Assessments should highlight the likely impact of each development and the potential for funding contributions should be agreed between the developer and the Local Authority.

Table 2C: Performance of A60 Nottingham Road / Berry Hill Lane (Local Plan)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Nottingham Road (N) Left Ahead	114.5%	80.1	99.9%	26.0
Nottingham Road (N) Ahead Right	113.4%	31.3	100.1%	27.4
Berry Hill Lane Left Ahead Right	113.9%	54.1	100.1%	23.5
Nottingham Road (S) Left Ahead	76.3%	14.1	94.1%	19.9
Nottingham Road (S) Ahead Right	80.1%	15.4	95.6%	22.8
Atkin Lane Left Ahead Right	116.4%	54.2	97.8%	22.2
Junction Summary	PRC	-29.3	PRC	-11.3
	Veh Delay (PCU Hrs)	200.85	Veh Delay (PCU Hrs)	90.60

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 2C above shows the impact of the Local Plan growth scenario which results in the junction operating with increased Degrees of Saturation on all arms when compared to the Reference Case scenario. For example, in the AM peak hour the total junction delay would increase from 148 pcu-hours in the 2031 Reference Case to 201 pcu-hours with Local Plan growth.

Given the junction land constraints outlined for the Reference Case, the opportunities for further mitigation may be restricted. One potential strategy might be to adjust the traffic signal settings to allocate priority to the A60 Nottingham Road, which is the main bus route. The green time allocated to Berry Hill Lane and Atkin Lane would thus be restricted and the vehicles on these routes would have to find an alternative route in order to minimise their journey times. This was not considered to be an appropriate mitigation strategy by Nottinghamshire County Council on grounds of potential rat-running on less appropriate routes.

An alternative approach to improving bus journey times through this junction is to implement inbound bus lanes and a GPS based system to enable approaching busses to pass through the junction with minimal delay. The cost of a GPS system is typically £4000-£5000 per junction. A CCTV based system could also be implemented to enable the urban traffic control centre to intervene with signal settings to respond to incidents and events as they occur.

Carter Lane / Southwell Road / Windsor Road

This is a signalised junction and, as such, has been assessed using LINSIG3. Southwell Road is an arterial route to/from Mansfield town centre. Carter Lane accesses local housing but also provides routes to Forest Town and Clipstone to the east of Mansfield.

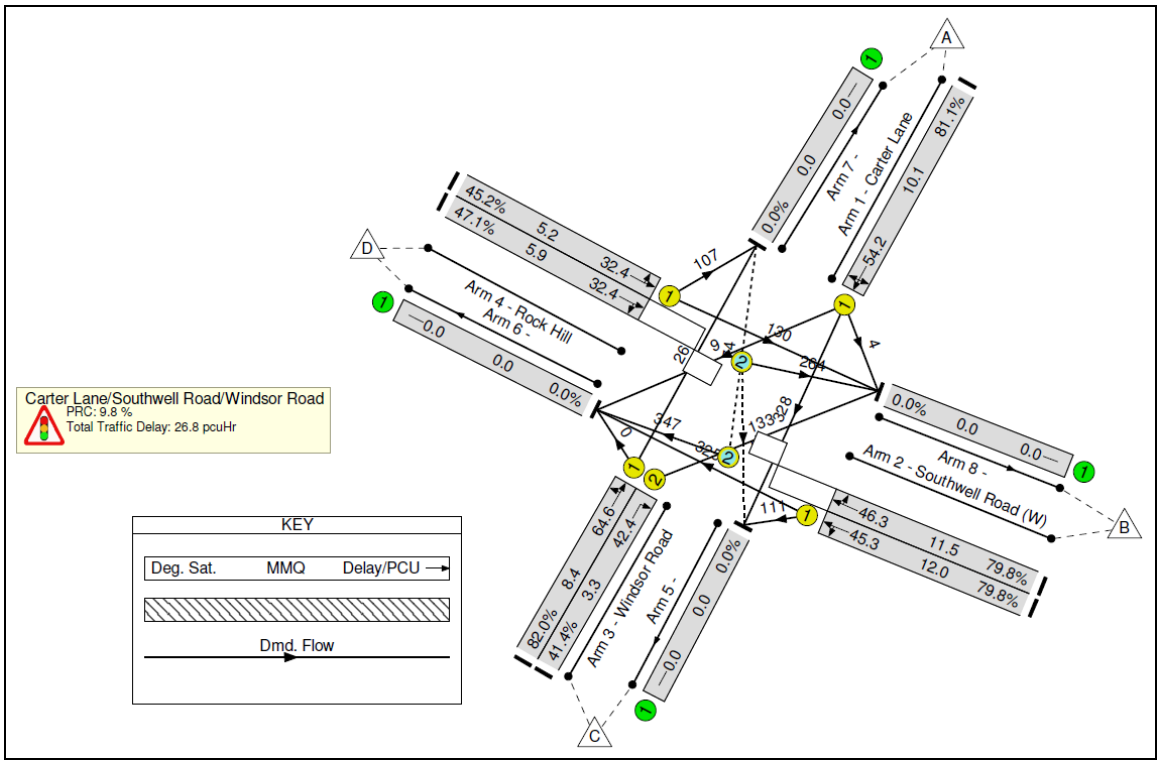


Table 3B: Performance of Carter Lane / Southwell Rd / Windsor Rd (Reference Case)

Approach Lane	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Carter Lane Left Ahead Right	84.1%	10.8	99.0%	16.5
Southwell Road (W) Left Ahead	83.0%	12.5	79.8%	14.4
Southwell Road (W) Ahead Right	83.8%	12.7	101.9%	9.1
Windsor Road Left Ahead	82.7%	9.0	104.3%	18.7
Windsor Road Right	44.9%	3.8	80.2%	6.9
Rock Hill Left Ahead	56.8%	6.8	61.8%	9.2
Rock Hill Ahead Right	59.4%	7.6	63.7%	10.2
Junction Summary	PRC	7.0	PRC	-15.9
	Veh Delay (PCU Hrs)	30.93	Veh Delay (PCU Hrs)	52.31

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PC- hours per hour.

Table 3B indicates that the junction would operate within capacity in the 2031 Reference Case in the AM peak hour, although Carter Lane, Southwell Road and Windsor Road would be heavily loaded approaches.

The PM peak hour results indicate that Carter Lane, Southwell Road and Windsor Road would have degrees of saturation of greater than the target value of 90% and would be approximately 100%.

It may be acceptable to the Highway and District authorities to allow queuing on the non strategic routes (Carter Lane and Windsor Road) in order to give additional capacity to the strategic traffic to/from Mansfield (Southwell Road). A detailed review at this traffic signal junction might show that fine tuning of the signal timings would resolve some of the capacity issues associated with the Reference Case traffic without physical works at the junction.

Although two of the approaches would appear to be operating slightly over capacity in the PM peak, the overall assessment is that the operational performance of this junction would be acceptable in the AM peak and at capacity in the PM peak.

Table 3C: Performance of Carter Lane / Southwell Rd / Windsor Rd (Local Plan)

Approach Lane	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Carter Lane Left Ahead Right	89.5%	12.7	106.8%	25.0
Southwell Road (W) Left Ahead	92.6%	17.4	84.1%	16.4
Southwell Road (W) Ahead Right	90.8%	12.7	112.3%	14.1
Windsor Road Left Ahead	87.9%	9.9	104.7%	19.1
Windsor Road Right	48.9%	4.0	88.6%	8.8
Rock Hill Left Ahead	56.8%	7.0	63.2%	9.8
Rock Hill Ahead Right	58.5%	7.7	64.3%	10.4
Junction Summary	PRC	-2.9	PRC	-24.7
	Veh Delay (PCU Hrs)	38.14	Veh Delay (PCU Hrs)	69.44

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PC- hours per hour.

Table 3C indicates that the junction would operate at capacity in the 2031 Local Plan in the AM peak hour, particularly the Southwell Road approach.

The PM peak hour results indicate that Carter Lane, Southwell Road and Windsor Road would have degrees of saturation of greater than 100% and as a result queuing would start to become commonplace.

The requirement for mitigation at this junction increases in the Local Plan growth scenario over the Reference Case scenario. Fine tuning of the signal timings and lane markings may resolve some of the capacity issues however a target of lower than 90% in the PM Peak may be unachievable using low-cost adjustments.

One solution might be to ban the turning movement from Southwell Road (W) to Carter Lane; however consideration would need to be given as to the potential diversion routes used by the displaced vehicles. This has been rejected as a possible solution by Nottinghamshire County Council.

A second solution might be to construct an additional lane on the inbound direction, although this would need a detailed feasibility study. Considering the possibility for developer funding contributions; no single large development sites are located nearby which could be considered to have a significant impact by itself, instead small cumulative impacts are adding to demand in the Local Plan scenario. Funding for a significant scheme would have to be sought by other means.

A lower cost, and impact, alternative could be to implement a nearside crossing detection system where pedestrian crossings are contained within this junction, this would potentially reduce the amount of time 'lost' to excess or unused time during the pedestrian phase. Without an identified funding source, it is unlikely that a low cost mitigation strategy will fully address queues at this junction in the Local Plan scenario.

A60 Leeming Lane / New Mill Lane

This is a signalised junction and, as such, has been assessed using LINSIG3. The A60 Leeming Lane is an arterial route linking Mansfield and Market Warsop. New Mill Lane links Mansfield Woodhouse to the west and Forest Town to the east.

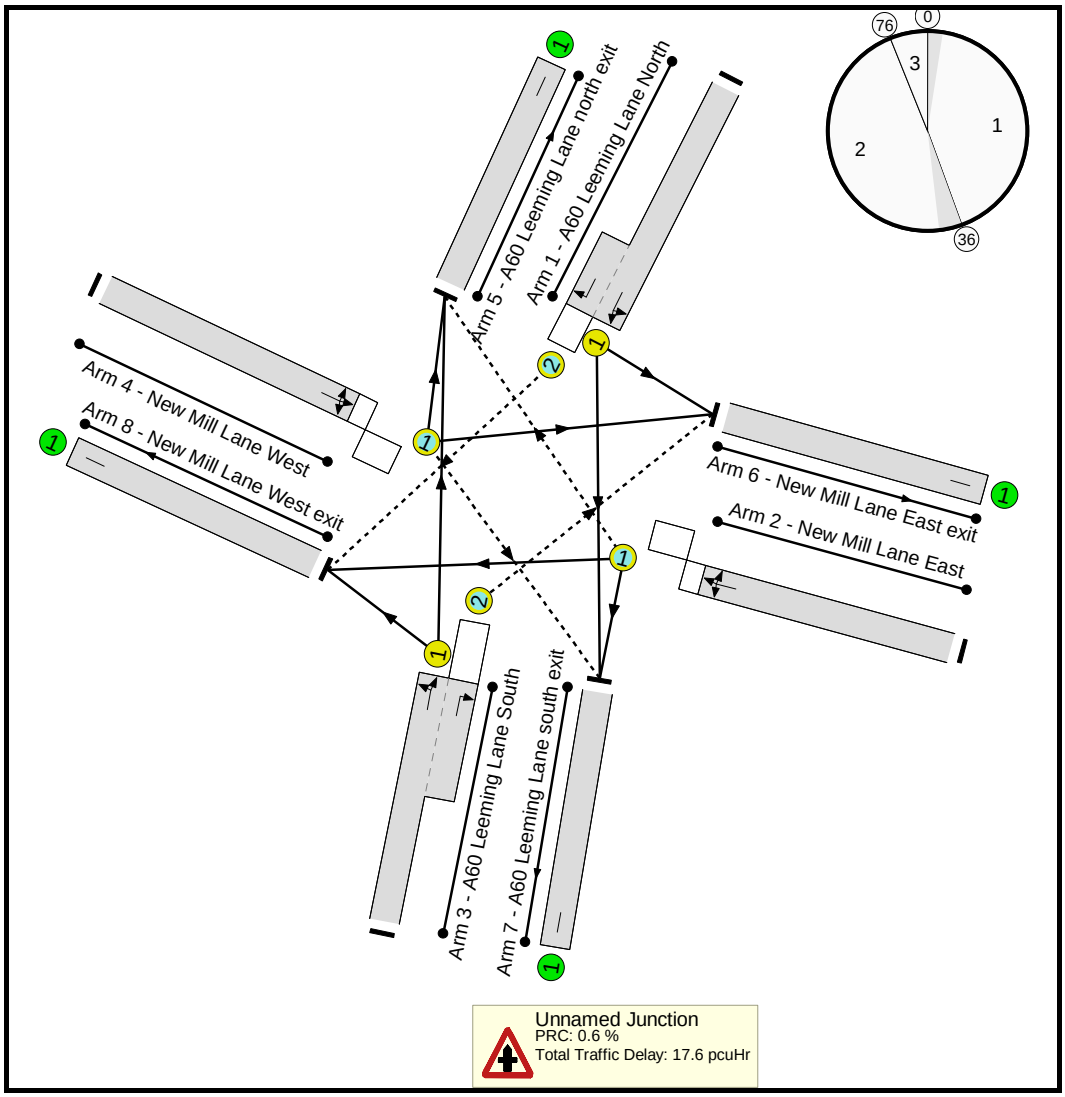

76
0
3
1
2
36
Arm 5 - A60 Leeming Lane north exit
Arm 1 - A60 Leeming Lane North
Arm 4 - New Mill Lane West
Arm 8 - New Mill Lane West exit
Arm 6 - New Mill Lane East exit
Arm 2 - New Mill Lane East
Arm 3 - A60 Leeming Lane South
Arm 7 - A60 Leeming Lane south exit
Unnamed Junction
PRC: 0.6 %
Total Traffic Delay: 17.6 pcuHr

Table 4B: Performance of A60 Leeming Lane / New Mill Lane (Reference Case)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
A60 Leeming Lane (N) Left Ahead Right	95.2%	18.5	94.1%	16.2
New Mill Lane (E) Left Ahead Right	95.7%	13.1	111.0%	34.9
A60 Leeming Lane (S) Left Ahead Right	68.3%	7.9	107.6%	51.2
New Mill Lane (W) Left Ahead Right	39.4%	2.9	54.6%	4.7
Junction Summary	PRC	-6.4	PRC	-23.3
	Veh Delay (PCU Hrs)	24.23	Veh Delay (PCU Hrs)	84.39

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 4B shows the results from the LINSIG analysis and identifies that the junction would not operate within capacity in the 2031 Reference Case in the PM peak; with one of the opposing arms over capacity in each stage. In the AM Peak the junction would be near to capacity.

Operational performance of this junction could be improved by extending cycle times, from 55 seconds to 78 seconds in the AM peak and to 90 seconds in the PM peak. This would result in the junction operating below capacity in the AM peak, but remain near to or at capacity in the PM peak. However this would cause adverse impacts for pedestrians, in the PM peak they might have to wait for an additional 35 seconds. Given that the junction operates on MOVA control, this is likely to occur in response to the increased demand.

To address queues further, one potential solution would be to discourage trips from using New Mill Lane and use Old Mill Lane instead, which is classified as an A-road (A6117). This strategy would allow more green time to be allocated to the A60 movements. However, the A60 Leeming Lane / Old Mill Lane / Butt Lane junction is also constrained from substantial capacity improvement by adjacent land-uses, albeit to a lesser extent than the New Mill Lane junction. Nottinghamshire County Council do not consider this to be an appropriate mitigation strategy because the potential traffic increases on the diversion routes are perceived to be too severe.

Further intervention is likely to be needed at this junction, particularly to the New Mill Lane approach from the east. The potential to widen the New Mill Lane carriageway is limited by the existing adjacent land use. However, if funding could be sought from Committed Development sites that have an impact upon this junction, it may be possible for the necessary land to be acquired. Given the location of this site, the developments most likely to have an impact upon junction's operation are; Former Wood Bros and King Street/Wood Street located towards Market Warsop.

A bus priority scheme along the A60 from Peafield Lane to Mansfield centre is planned; this could be supplemented by a GPS based bus detection system at this junction. Sustainable transport policies suggest that the need for junction

improvements may be reduced if bus transit times can be adequately addressed by these other means.

Table 4C: Performance of A60 Leeming Lane / New Mill Lane (Local Plan)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
A60 Leeming Lane (N) Left Ahead Right	101.6%	31.7	105.9%	43.1
New Mill Lane (E) Left Ahead Right	99.7%	16.7	109.9%	34.1
A60 Leeming Lane (S) Left Ahead Right	72.5%	9.0	119.6%	99.4
New Mill Lane (W) Left Ahead Right	45.1%	3.3	53.0%	4.4
Junction Summary	PRC	-12.8	PRC	-32.9
	Veh Delay (PCU Hrs)	40.19	Veh Delay (PCU Hrs)	156.59

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

In the AM peak capacity issues exist on the A60 Leeming Lane (N) and New Mill Lane (E) arms of the junction.

As a result of the Local Plan growth, the approaches from A60 Leeming Lane (N), New Mill Lane (E) and A60 Leeming Lane (S) are a particular issue in the PM peak. Table 4C shows that large queues could be expected to form, particularly on A60 Leeming Lane (S).

Mitigation would be necessary at this junction. It might be possible to increase cycle times and optimise the phases. By increasing both AM and PM peak to 90 second cycles; the AM peak would operate within capacity but the PM peak would still be over capacity on New Mill Lane (E) and A60 Leeming Lane (S). This increase in cycle time would be to the detriment of pedestrian movements at this junction.

Physical mitigation may be required in order for this junction to operate efficiently although the junction is constrained by houses on all sides. To secure developer funding for such an improvement the traffic impacts from the relevant Transport Assessments of the following Local Plan sites should be considered; Leeming Lane South open space, Ridgeway Terrace and other Allotments, Land at Former Market Warsop Station, Land adj Recycling Depot. Any funding agreements would be between the Local Authority and relevant site developer.

A617 MARR / A6191 Southwell Road

The A617 MARR route provides links to Mansfield, the M1 and Nottingham to the west and Newark to the east. The A6191 provides links to Mansfield to the north and Rainworth to the south. This is a roundabout junction and, as such, has been assessed using ARCADY.

Table 5B: A617 MARR / A6191 Southwell Road (Reference Case)

Approach	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	RFC	Q	RFC	Q
A6191 Southwell Road	0.780	3.4	0.745	2.8
A617 Rainworth Bypass	0.741	2.8	0.584	1.4
B6020	0.729	2.6	0.379	0.6
A617 MARR	0.530	1.1	0.601	1.5

Notes: RFC = Ratio of Flow to Capacity. A measure of the trafficking at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a worst arm basis. It is measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU; 1 bus = 2 PCU etc.

In the both the AM and PM peak hour Southwell Road (E) operates with the highest RFC values, however only slight queues form on this approach. All approaches are less than the target RFC value of 0.85. The operational performance of the junction is considered to be acceptable in both peak hour periods.

Table 5C: A617 MARR / A6191 Southwell Road (Local Plan)

Approach	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	RFC	Q	RFC	Q
A6191 Southwell Road	0.787	3.6	0.765	3.1
A617 Rainworth Bypass	0.741	2.8	0.585	1.4
B6020	0.749	2.9	0.386	0.6
A617 MARR	0.638	1.7	0.583	1.4

Notes: RFC = Ratio of Flow to Capacity. A measure of the trafficking at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a worst arm basis. It is measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU; 1 bus = 2 PCU etc.

With the traffic growth from the Local Plan developments added, this junction would be expected to continue to operate within its design capacity. In both the AM and PM peak hour Southwell Road (E) operates with the highest RFC values, however only slight queues would form on this approach. All approaches are less than the target RFC value of 0.85. The operational performance of the junction is considered to be acceptable in both peak hour periods. No mitigation at this junction is considered to be necessary to fully implement the Local Plan developments.

It is noted that the Lindhurst development, as a pipeline scheme identified in the Reference Case list of developments, would provide a significant improvement to this junction as part of the Section 106 agreement with the Local Authority. The junction improvement would comprise of signalisation and localised widening to improve capacity. Given that the junction assessment provided for this junction did not identify any significant deterioration in operational efficiency under the current layout between the Reference Case and Local Plan, it is not anticipated that there would be any additional material impact from the Local Plan development upon the improved junction layout.

A60 Leeming Lane / Peafield Lane

This is a signalised junction and, as such, has been assessed using LINSIG3. The A60 provides a link between Mansfield and Market Warsop. Peafield Lane provides a route to Edwinstowe.

Signal timings and phasing at this junction have been based upon on-site observations and timings. It is noted that this traffic signal junction operates under MOVA control.

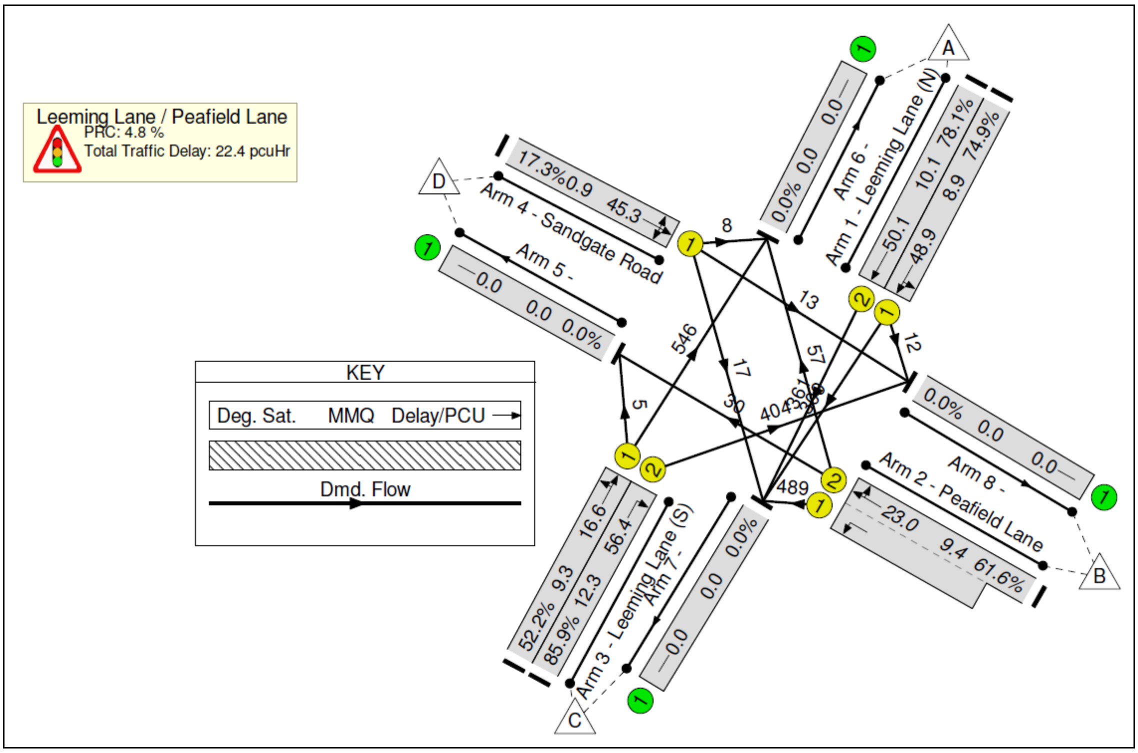

Leeming Lane / Peafield Lane
PRC: 4.8 %
Total Traffic Delay: 22.4 pcuHr
KEY
Deg. Sat. MMQ Delay/PCU
Dmd. Flow
Arm 1 - Leeming Lane (N)
Arm 2 - Peafield Lane
Arm 3 - Leeming Lane (S)
Arm 4 - Sandgate Road
Arm 5 -
Arm 6 -
Arm 7 -
Arm 8 -
A
B
C
D

Table 6B: Performance of A60 Leeming Lane / Peafield Lane (Reference Case)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Leeming Lane (N) Left Ahead	84.8%	12.1	86.7%	13.2
Leeming Lane (N) Ahead	84.8%	12.1	84.5%	12.4
Peafield Lane Left Ahead Right	84.1%	15.9	57.9%	10.5
Leeming Lane (S) Left Ahead	55.8%	7.3	75.8%	15.7
Leeming Lane (S) Right	84.8%	13.3	87.1%	19.7
Sandgate Road Left Ahead Right	25.5%	1.1	35.0%	1.6
Junction Summary	PRC	6.1	PRC	3.3
	Veh Delay (PCU Hrs)	26.20	Veh Delay (PCU Hrs)	27.97

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 6B shows the results of the LINSIG analysis and identifies that the junction would operate within capacity in the 2031 Reference Case in both the AM and PM peak hour.

The PM peak hour results show that Leeming Lane (N) and the right turn from Leeming Lane (S) into Peafield Lane have degrees of saturation of approaching 90%. Overall this junction is considered to be operating within capacity in the Reference Case scenario.

Table 6C: Performance of A60 Leeming Lane / Peafield Lane (Local Plan)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Leeming Lane (N) Left Ahead	88.2%	14.5	92.7%	17.9
Leeming Lane (N) Ahead	88.2%	14.5	92.6%	17.8
Peafield Lane Left Ahead Right	86.5%	17.0	61.8%	11.2
Leeming Lane (S) Left Ahead	62.9%	9.4	91.1%	28.8
Leeming Lane (S) Right	89.2%	16.0	93.7%	22.7
Sandgate Road Left Ahead Right	26.1%	1.3	35.0%	1.7
Junction Summary	PRC	0.9	PRC	-4.1
	Veh Delay (PCU Hrs)	31.27	Veh Delay (PCU Hrs)	41.77

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 6C shows the results of the LINSIG analysis and identifies that the junction operation would worsen with the Local Plan growth, in both the AM and PM Peak periods.

The results in Table 6C assume that the MOVA control would adjust signal timings to reduce delays and therefore times are different to those observed in the 2012 Base year.

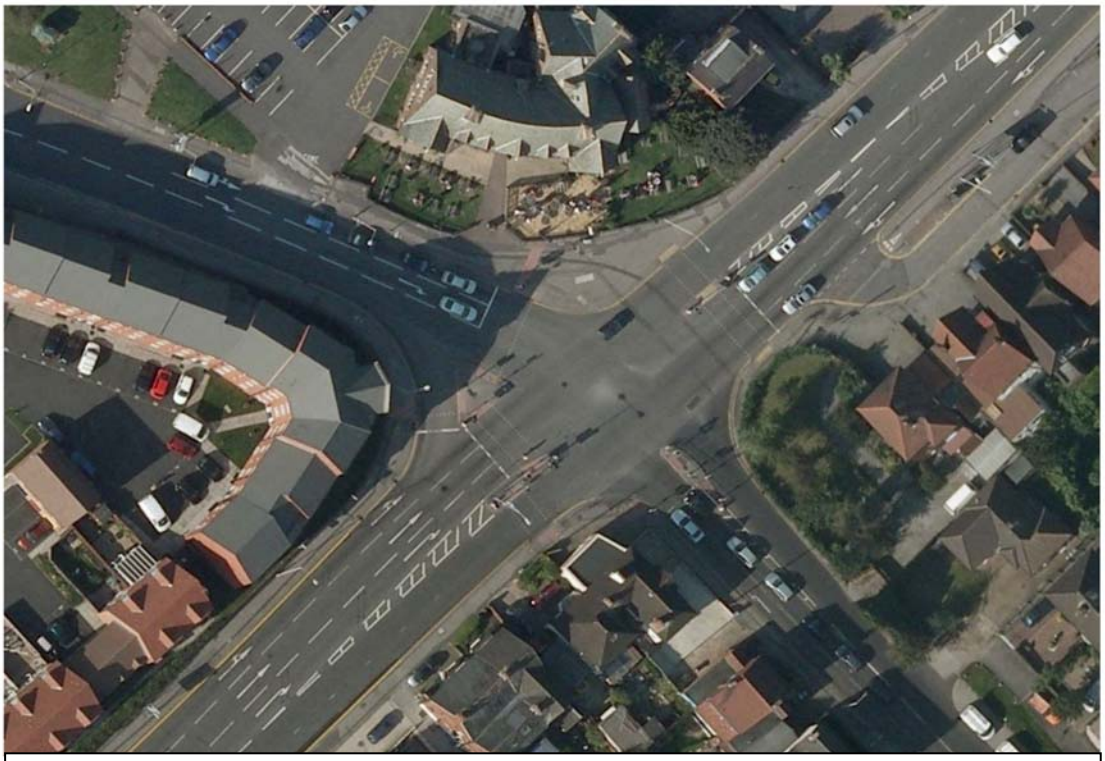
If further improvements to the operational performance of the traffic signals are needed, then other alternatives would need to be considered. The alternative options might include:

- prohibit eastbound exits from Sandgate Road in order to eliminate a signal phase;
- rearrange the pedestrian crossing layout to reduce inter-green times and improve traffic green phases; or
- provision of additional lanes/width for northbound ahead movements.

The first two of these options have been rejected by Nottinghamshire County Council as they will encourage traffic flow increases onto less suitable routes. This leaves widening as the only possible option to accommodate any excess traffic volumes as a result of the Local Plan. Developer contributions can be sought from the following sites, should a significant investment be required; Ridgeway Terrace and other allotments and Land at former Market Warsop Station.

A38 Sutton Road / Skegby Lane

This is a signalised junction and, as such, has been assessed using LINSIG3. The A38 forms the south west radial route into Mansfield town centre. Skegby Lane on the west side of the junction provides a link to the northern part of Sutton in Ashfield. Sheepbridge Lane to the south east of the junction provides a route to the Berry Hill area of Mansfield. The results of the operational analysis are presented in Table 7B and 7C.



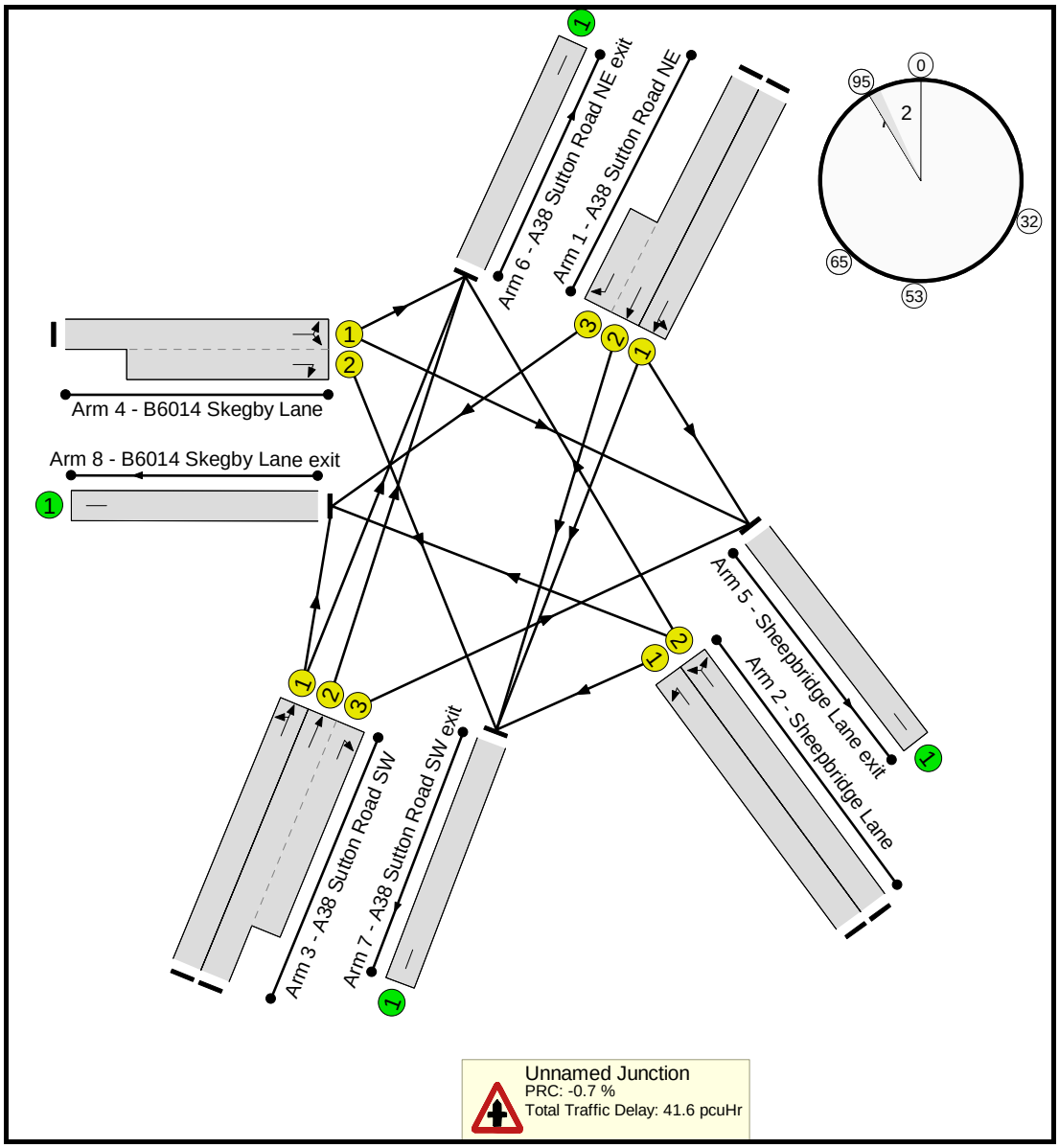

Arm 6 - A38 Sutton Road NE exit
Arm 1 - A38 Sutton Road NE
Arm 4 - B6014 Skegby Lane
Arm 8 - B6014 Skegby Lane exit
Arm 5 - Sheepbridge Lane exit
Arm 2 - Sheepbridge Lane
Arm 3 - A38 Sutton Road SW
Arm 7 - A38 Sutton Road SW exit
0
95
2
32
65
53
Unnamed Junction
PRC: -0.7 %
Total Traffic Delay: 41.6 pcuHr

Table 7B: Performance of A38 Sutton Road / Skegby Lane (Reference Case)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
A38 Sutton Road NE Left Ahead	52.2%	8.8	64.1%	10.7
A38 Sutton Road NE Ahead Right	68.2%	9.4	67.3%	11.1
Sheepbridge Lane Left Ahead Right	81.5%	9.1	90.5%	13.7
A38 Sutton Road SW Left Ahead	77.9%	15.6	83.9%	17.9
A38 Sutton Road SW Ahead Right	81.0%	16.1	87.5%	19.2
B6014 Skegby Lane Left Ahead Right	90.6%	15.6	92.0%	15.0
Junction Summary	PRC	-0.7	PRC	-2.2
	Veh Delay (PCU Hrs)	41.63	Veh Delay (PCU Hrs)	48.61

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hour per hour.

Table 7B shows that the junction would operate within capacity in the 2031 Reference Case AM peak hour, although B6014 Skegby Lane is approaching capacity with a DoS above 90% in the AM peak.

In the PM peak, Skegby Lane approach has the highest Degree of Saturation at 92%. Skegby Lane and Sheepbridge Lane are approaching capacity even with the signal timings optimised during the analysis.

Where DoS values are greater than the target value of 90%, all DoS are below 100%. The operational performance of the junction is considered to be operating near to capacity in the PM peak hour.

The junction has residential and public house premises on the four corners so localised widening of the approaches would be likely to require the acquisition of property. Cycle times at the junction could be extended to increase vehicle capacity but this would come with a disbenefit to pedestrian wait times.

Table 7C: Performance of A38 Sutton Road / Skegby Lane (Local Plan)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
A38 Sutton Road NE Left Ahead	58.4%	9.8	75.1%	12.5
A38 Sutton Road NE Ahead Right	64.9%	9.6	75.0%	12.8
Sheepbridge Lane Left Ahead Right	87.5%	9.9	106.4%	39.7
A38 Sutton Road SW Left Ahead	85.9%	17.5	106.2%	44.6
A38 Sutton Road SW Ahead Right	86.7%	18.7	105.1%	51.6
B6014 Skegby Lane Left Ahead Right	86.6%	13.9	102.9%	29.4
Junction Summary	PRC	2.8	PRC	-18.2
	Veh Delay (PCU Hrs)	44.38	Veh Delay (PCU Hrs)	141.39

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hour per hour.

Table 7C shows that the junction would operate within capacity in the 2031 Local Plan AM peak hour, as all approaches have a DoS below the 90% target.

In the PM peak, A38 Sutton Road (SW) and Sheepbridge Lane are over operating capacity.

The junction has residential properties, a shop and a public house premises on the four corners and localised carriageway widening of the approaches would likely require land acquisition outside of the highway boundary.

A mitigation strategy might be to restrict particular right turning movements at the junction so that traffic signal phases may be omitted or other traffic phases may be run in parallel. In order to ban right turns, alternative and acceptable diversion routes would need to be identified. This option has been rejected by Nottinghamshire County Council as being unacceptable based upon the likelihood of loading increased traffic flows along unsuitable streets.

The junction already has SCOOT control which, may improve capacity by optimising the signal timings to better match the future year traffic demands; for example by allocating more priority to A38 Sutton Road (SW) and Sheepbridge Lane and reducing green times for A38 Sutton Road (NE). Such a strategy might encourage trips on Sheepbridge Lane and Skegby Lane to seek out alternative routes. However, the DoS on each arm would likely be operating at capacity.

There is an opportunity to install MOVA control at this junction along with nearside crossing detection. MOVA, which costs approximately £40,000 to £100,000 to implement, typically reduces delay by 13% which may be enough to offset the increased demand from Local Plan related traffic growth. If sources of funding for mitigation strategies were to be sought for this junction, the following Local Plan developments would be likely to have the greatest traffic related impacts; Vauxhall Garage Sutton Road, Sheepbridge Lane/Gibbons Road and Moor Lane. Any developer contributions would be agreed between the developer and the Local Authority and be based upon the impacts highlighted in their Transport Assessments.

A60 Church Street / Wood Street

This is a signalised junction and, as such, has been assessed using LINSIG3. The A60 Church Street provides links to Mansfield to the south and Worksop to the north. B6035 Church Street to the east provides local access to Market Warsop town centre and car parking. Signal timings and phasing for this junction have been based on on-site observations and timings.

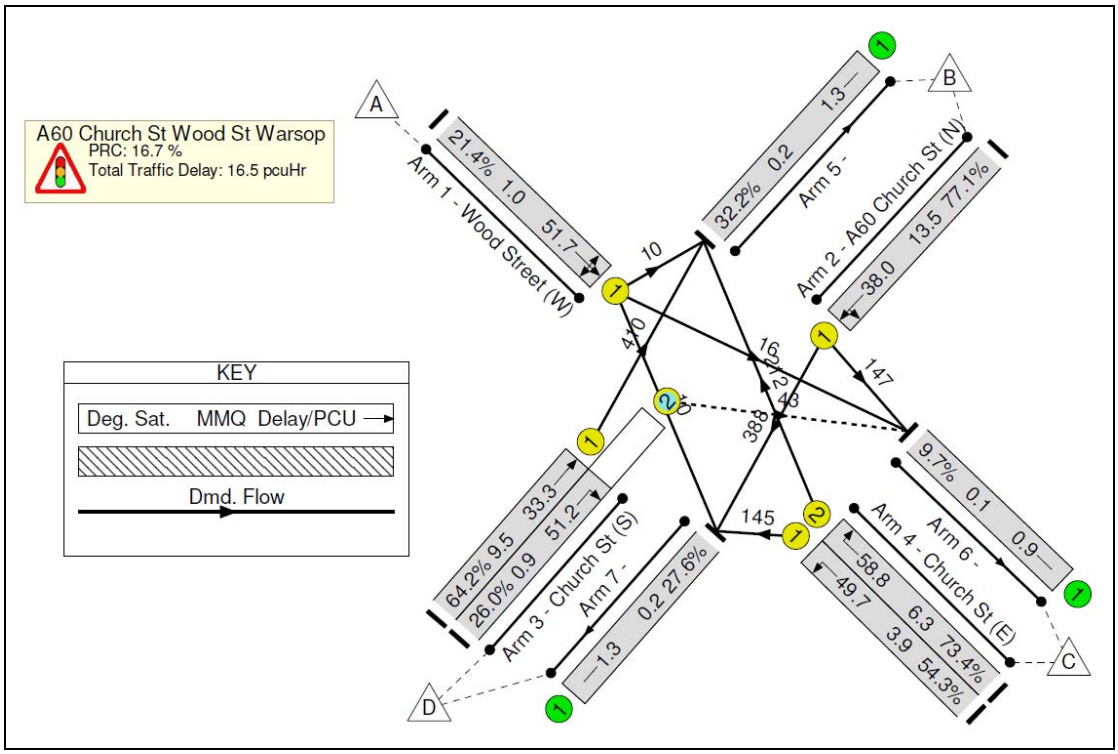

A60 Church St Wood St Warsop
PRC: 16.7 %
Total Traffic Delay: 16.5 pcuHr
KEY
Deg. Sat. MMQ Delay/PCU
Dmd. Flow
A
B
C
D
Arm 1 - Wood Street (W)
Arm 2 - A60 Church St (N)
Arm 3 - Church St (S)
Arm 4 - Church St (E)
Arm 5 -
Arm 6 -
Arm 7 -
21.4% 1.0 51.7
32.2% 0.2 1.3
38.0 13.5 77.1%
64.2% 9.5 33.3
26.0% 0.9 51.2
1.3 0.2 27.6%
58.8 6.3 73.4%
49.7 3.9 54.3%
9.7% 0.1 0.9
10
410
16
172
43
388
147
145

Table 8B: Performance of A60 Church Street / Wood Street (Reference Case)

Approach Lane	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Wood Street (W) Left Ahead Right	27.9%	1.3	16.6%	0.7
A60 Church St (N) Left Ahead	102.2%	35.8	114.5%	78.8
Church St (S) Ahead	84.9%	15.2	77.5%	13.0
Church St (S) Right	71.3%	2.1	63.8%	1.7
Church St (E) Left	71.9%	5.8	87.1%	8.1
Church St (E) Right	97.2%	13.6	108.1%	23.3
Junction Summary	PRC	-13.6	PRC	-27.2
	Veh Delay (PCU Hrs)	47.12	Veh Delay (PCU Hrs)	99.26

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU; 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 8B shows that the A60 Church Street (N) and Church Street (E) approaches to the junction would operate with a degree of saturation close to 100% in the 2031 Reference Case AM peak hour. In the AM peak, the junction would operate at capacity.

The PM peak hour results show that A60 Church Street (N) and Church Street (E) would have degrees of saturation in excess of 100%, which indicates that the junction would be over capacity in 2031.

Given that the degrees of saturation on the remaining approaches are lower in both the AM and PM peak hours, the optimisation of the traffic signals timings is likely to resolve some of the capacity issues at this junction. In addition, it is noted that the Base Year phasing arrangements included an 'all red' pedestrian stage. This could be reviewed so as to incorporate pedestrian crossing movements in combination with green light phases for traffic movements. This would require the installation of pedestrian refuge islands in the centre of the road and would require a detailed design to ensure that there is sufficient road space to install these. Nottinghamshire County Council rejected this proposal as the resulting stage sequences would be less desirable.

Another option considered would be to add MOVA system to the traffic controller at the junction. The cost would be approximately £40,000 to £100,000 and MOVA typically reduces delays by 13%, which may be sufficient for this junction to operate more efficiently in the PM Peak. Funding for this type of improvement could be secured from developer contributions from the Committed developments most likely to impact upon this junction; King Street/Wood Street, Goose Farm Wood Street, Former Wood Bros, Sherwood Street and Oakfield Lane, Rear of Cherry Paddocks and Moorefield Farm Bishops Walk. This would be in the form of an agreement between the Local Authority and the developer and based upon the size of the traffic impacts highlighted in the Transport Assessment for each site.

Table 8C: Performance of A60 Church Street / Wood Street (Local Plan)

Approach Lane	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	MMQ	DoS	MMQ
Wood Street (W) Left Ahead Right	27.9%	1.3	16.6%	0.7
A60 Church St (N) Left Ahead	111.7%	70.4	131.3%	143.7
Church St (S) Ahead	92.4%	20.1	99.5%	28.2
Church St (S) Right	90.0%	3.9	77.5%	2.5
Church St (E) Left	89.1%	8.2	98.0%	12.6
Church St (E) Right	118.3%	34.4	127.1%	49.8
Junction Summary	PRC	-31.4	PRC	-45.9
	Veh Delay (PCU Hrs)	108.04	Veh Delay (PCU Hrs)	206.52

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
MMQ = Mean Maximum Queue reported on a per arm basis and measured in PCUs.
PCU = Passenger Car Unit. 1 car = 1 PCU; 1 bus = 2 PCU etc.
PRC = Practical Reserve Capacity. A measure of the overall percentage "spare" capacity at a junction.
Delay = Vehicle Delay in PCU-hours per hour.

Table 8C shows that all approach arms at this junction would be operating under a higher traffic demand in the Local Plan growth scenario than in the Reference Case.

In the AM Peak Church Street (E) operates with the highest Degree of Saturation.

The PM peak hour results show that A60 Church Street (N) and Church Street (E) would have degrees of saturation of approximately 130%. These stop lines would both generate queues on the approaches.

The mitigation possibilities were outlined for the Reference Case growth scenario, e.g. installing MOVA, but this mitigation strategy is unlikely to deliver the additional capacity needed to accommodate the Local Plan traffic at this junction.

Given the relatively low flows out of Wood Street, a possibility considered was to close Wood Street to all motorised traffic which might allow more green-time to be allocated to the remaining signal stages. However, this strategy is likely to require a complimentary improvement to the A60 Church Street / Carr Lane junction, located to the south. A more rigorous mitigation strategy might include the widening of the A60 approaches; but this is likely to require land take and therefore could only be delivered at a social and monetary cost

The Local Plan developments that are likely to have greatest traffic impacts at this junction are; Ridgeway Terrace and Other Allotments, Sherwood Street, Mount Pleasant Allotments, Land adj Recycling Depot, Land at Former Market Warsop Station, Moorfields Farm, Church Warsop Miners Welfare and The Former Strand Bingo Hall and adj Builders Yard.

Further land take by this junction may be unacceptable to the economy of the local centre. Subject to further assessment, an A60 Market Warsop bypass could facilitate all Local Plan growth aspirations on a traffic impact level by removing most A60 through movements. It is unlikely that the required level of funding for a full-scale

scheme could be raised solely through developers' contributions and maintain each of the Local Plans sites commercial viability.

The remaining option is to do the minimum and accept that potential queuing and delays at this junction is likely should all Local Plan development be constructed. The benefits of development would need to be balanced against the additional costs to road users.

A60 Leeming Lane / A6075 Warsop Road

This is a priority junction and, as such, has been assessed using PICADY. The A60 Leeming Lane forms a major north east route between Mansfield town centre and Market Warsop. The A6075 Warsop Road provides access to Mansfield Woodhouse. This is an additional junction which was identified by the SATURN traffic model as potentially being over capacity in the 2031 Local Plan growth scenario.

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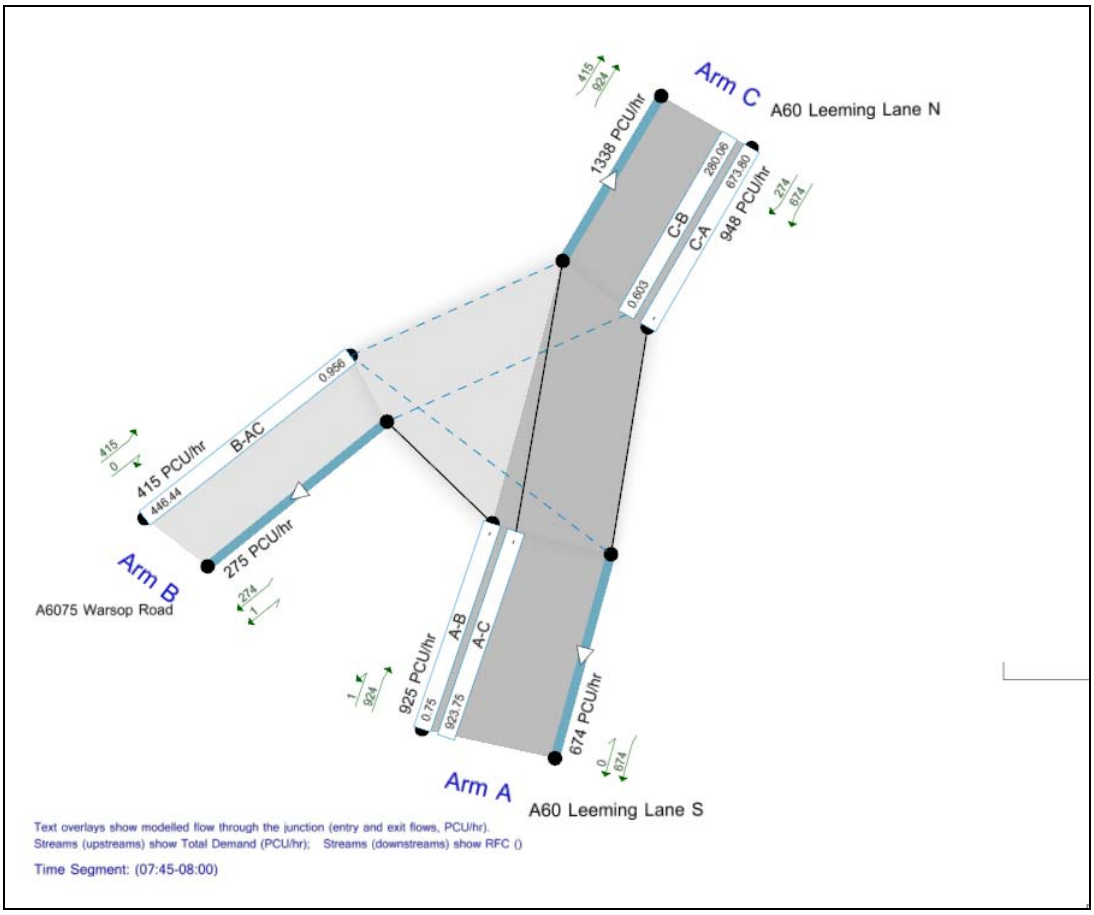
Arm C
A60 Leeming Lane N
1338 PCU/hr
948 PCU/hr
C-B
C-A
280.06
673.80
0.603
415
924
274
674
Arm B
A6075 Warsop Road
415 PCU/hr
B-AC
0.956
446.44
275 PCU/hr
415
0
274
1
925 PCU/hr
A-B
A-C
0.75
923.75
1
924
674 PCU/hr
0
674
Arm A
A60 Leeming Lane S
Text overlays show modelled flow through the junction (entry and exit flows, PCU/hr).
Streams (upstreams) show Total Demand (PCU/hr); Streams (downstreams) show RFC ()
Time Segment: (07:45-08:00)

Table 9C: Performance of A60 Leeming Lane / A6075 Warsop Road (Local Plan)

Approach Lane (and flare)	AM (0800 – 0900hrs)		PM (1700 – 1800hrs)	
	DoS	Q	DoS	Q
A60 Leeming Lane (S) Left Ahead	-	-	-	-
A6075 Warsop Road Left Right	77%	3.2	116%	35.1
A60 Leeming Lane (N) Ahead Right	139%	117.7	184%	214.9
Junction Summary	Veh Delay (PCU Hrs)	504.7	Veh Delay (PCU Hrs)	1125.8

Notes: DoS = Degree of Saturation. A measure of the trafficking of an approach to the junction in relation to its ability to accommodate such flow.
Q = 'Worst queue in PCUs over the whole time period.
PCU = Passenger Car Unit. 1 car = 1 PCU / 1 bus = 2 PCU etc.
Delay = Vehicle Delay in PCU-hours per hour.

Table 9C shows the results from the PICADY analysis and identifies that the junction would not operate within capacity in the 2031 Local Plan scenario in either the AM or PM peak hours.

Queues arise because drivers turning right from Leeming Lane into Warsop Road would block the vehicles behind attempting to go ahead. In addition, the increased flow on Leeming Lane is likely to cause delays on Warsop Road in the PM peak because vehicles at the stop line would be unable to find suitable gaps in traffic into which to pull-out. The visibility to the right, from vehicles exiting Warsop Road, is limited by the presence of the bus shelter on Leeming Lane.

The potential to widen the carriageway is limited by the existing adjacent land use, however there may be benefits to assessing a signalled junction at this location. Changes at this junction may also require a review of the bus stop provision on Leeming Lane.

Nottinghamshire County Council has developed a preliminary traffic signal design for this junction to address some of the queuing issues. Currently, no funding source has been identified for this scheme and therefore it is likely that contributions from nearby developments would be required.

This junction could also be incorporated into a wider A60 bus priority scheme which would limit delays encountered by public transport.

The following development sites are considered to contribute to the traffic growth at this junction; Leeming Lane South open space, Ridgeway Terrace and other Allotments, Land at Former Market Warsop Station, Land adj Recycling Depot. Potential contributions would be based upon each site's likely traffic impact and this should be identified in their relevant Transport Assessment.

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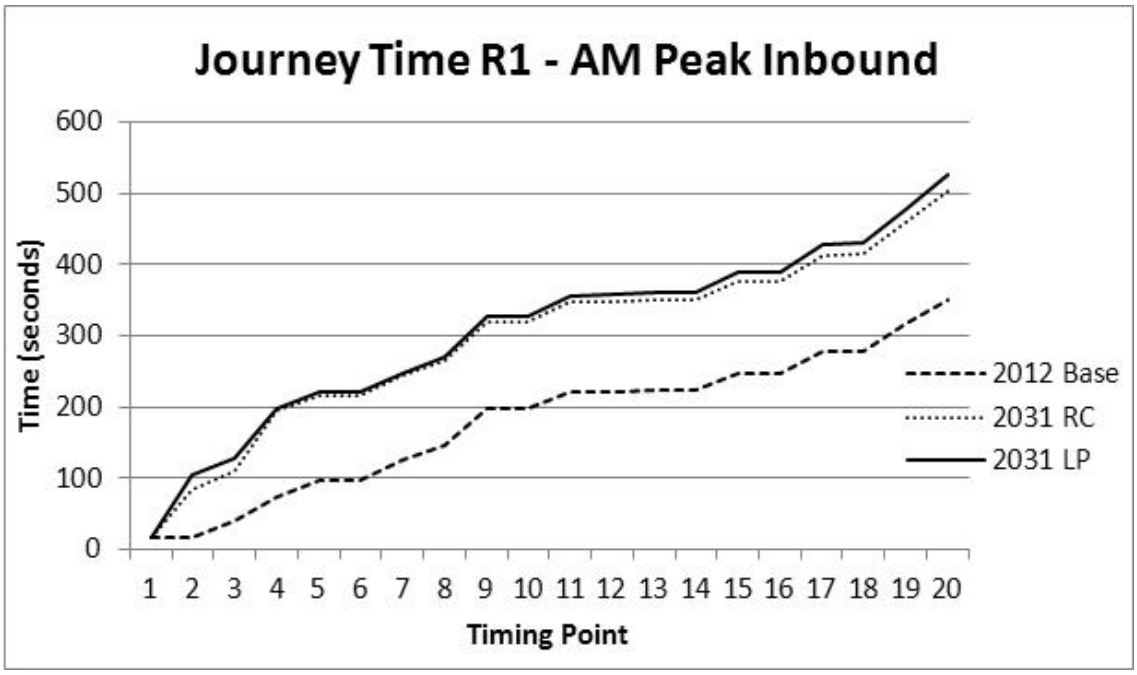
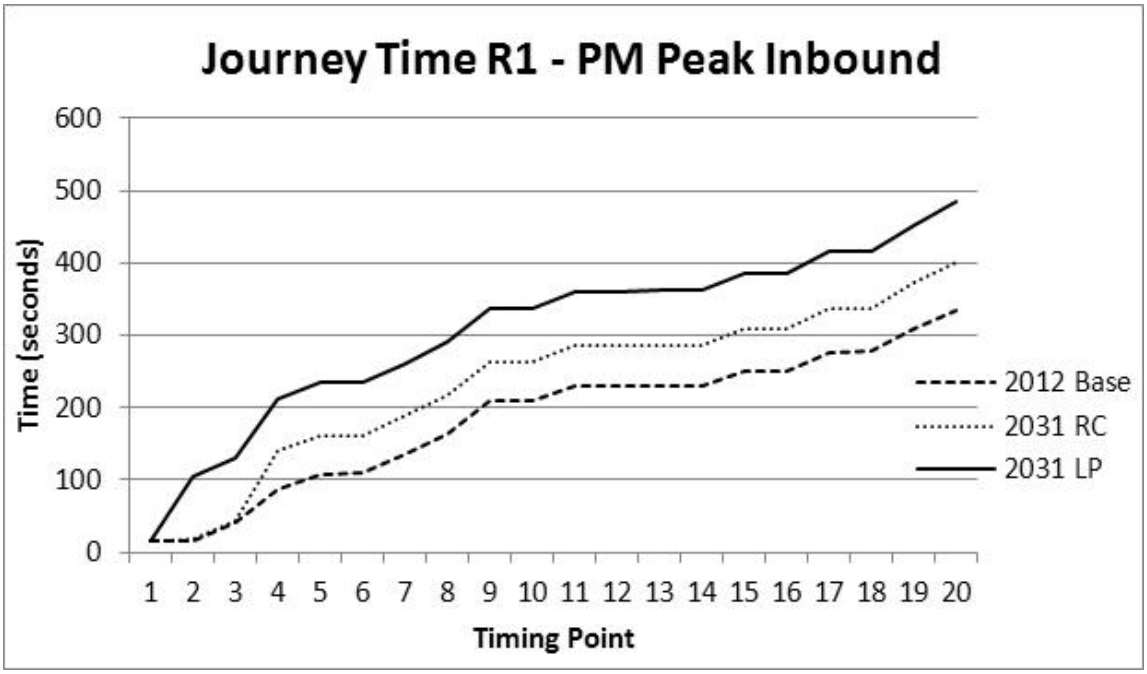
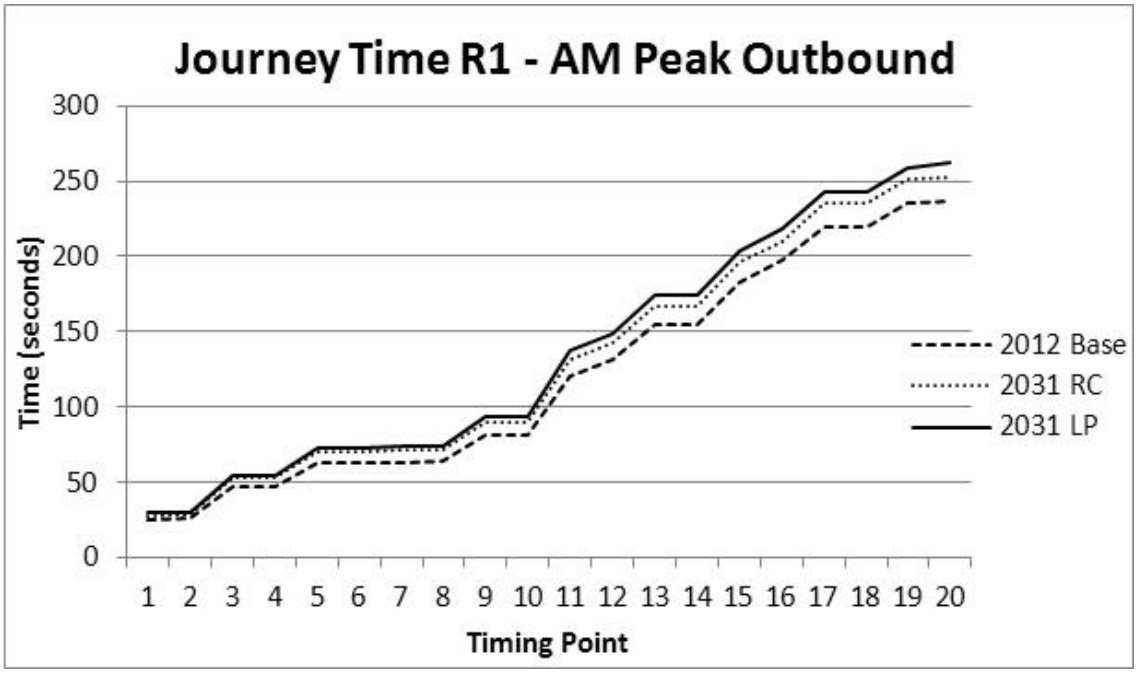
APPENDIX C
Route Time-Distance Plots

Appendix C: Journey Time Route Charts



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Time (seconds)
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250
200
150
100
50
0
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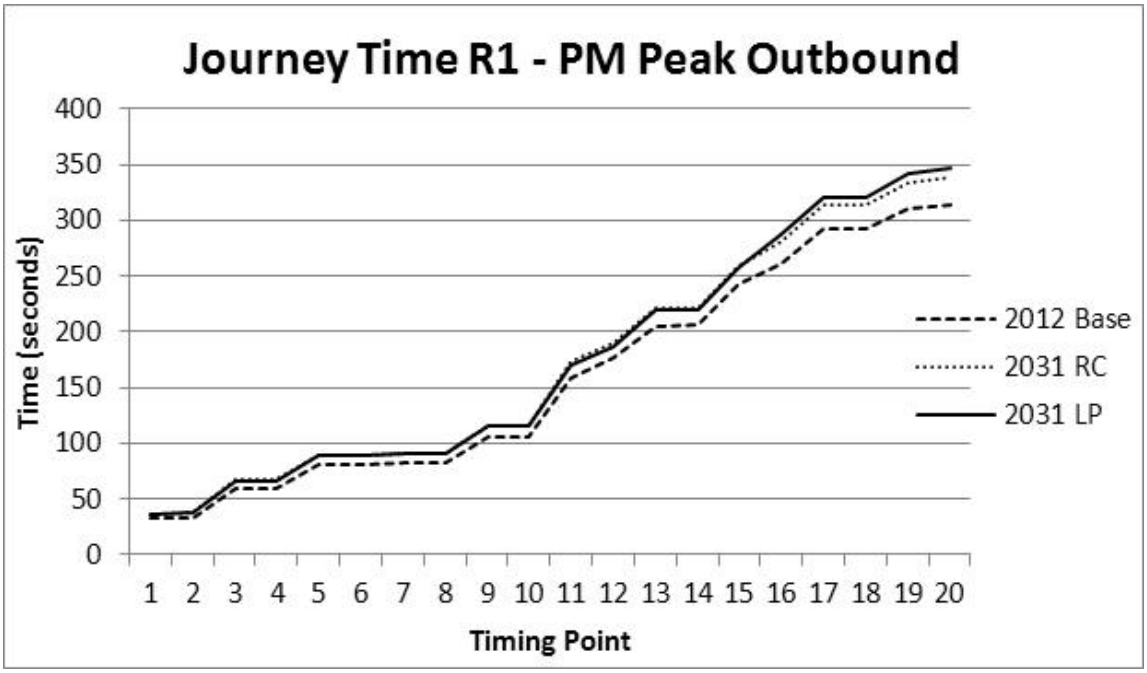
Timing Point
2012 Base
2031 RC
2031 LP


Journey Time R1 - PM Peak Outbound
Time (seconds)
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100
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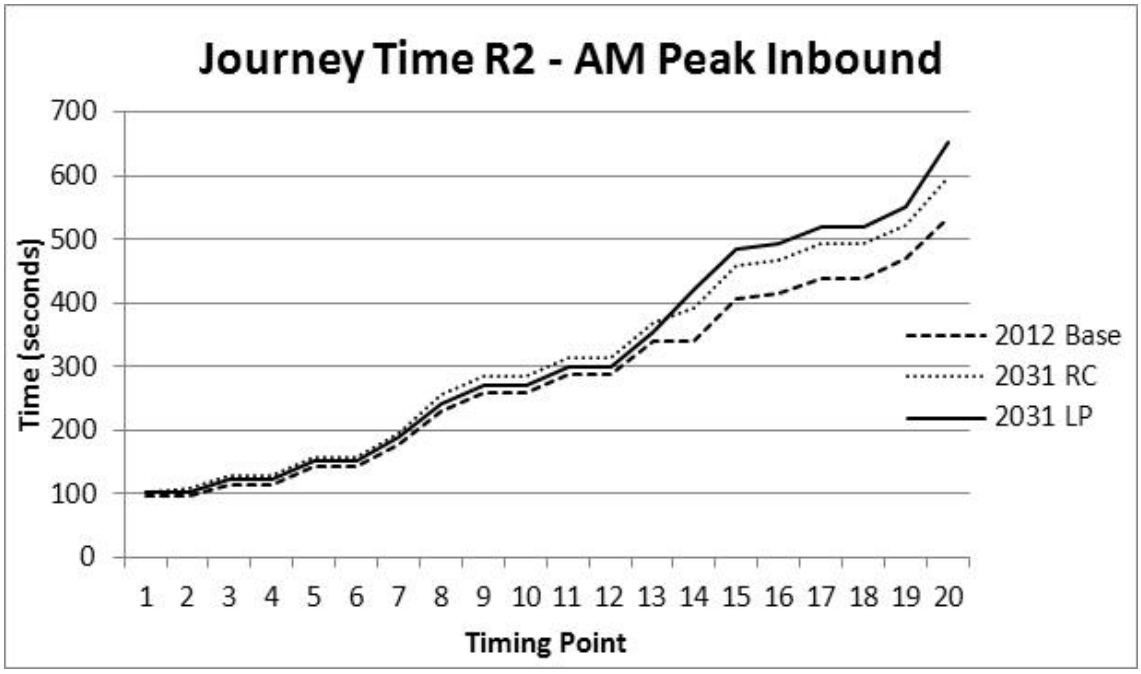
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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600
500
400
300
200
100
0
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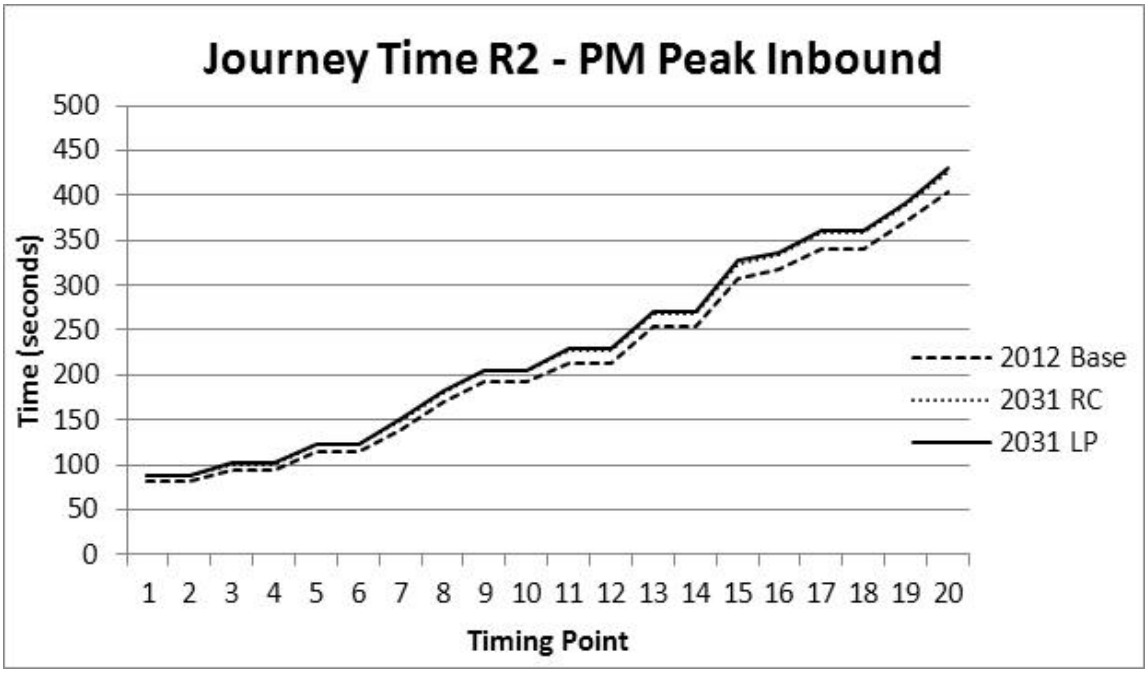
Timing Point
2012 Base
2031 RC
2031 LP


Journey Time R2 - PM Peak Inbound
Time (seconds)
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400
350
300
250
200
150
100
50
0
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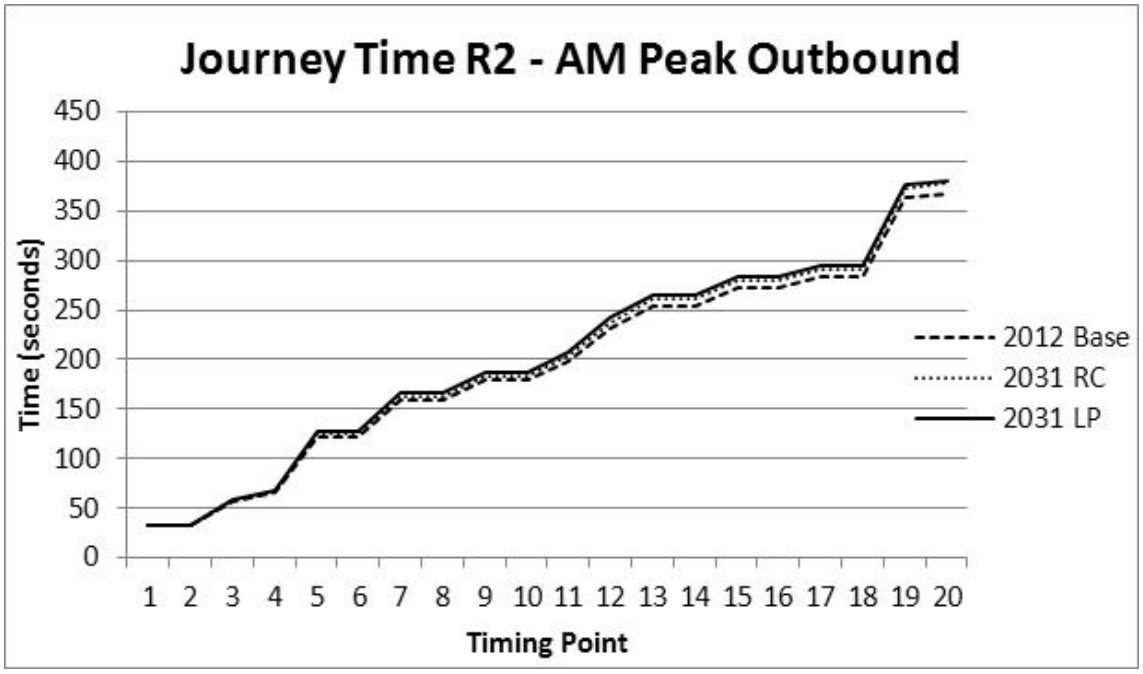
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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200
150
100
50
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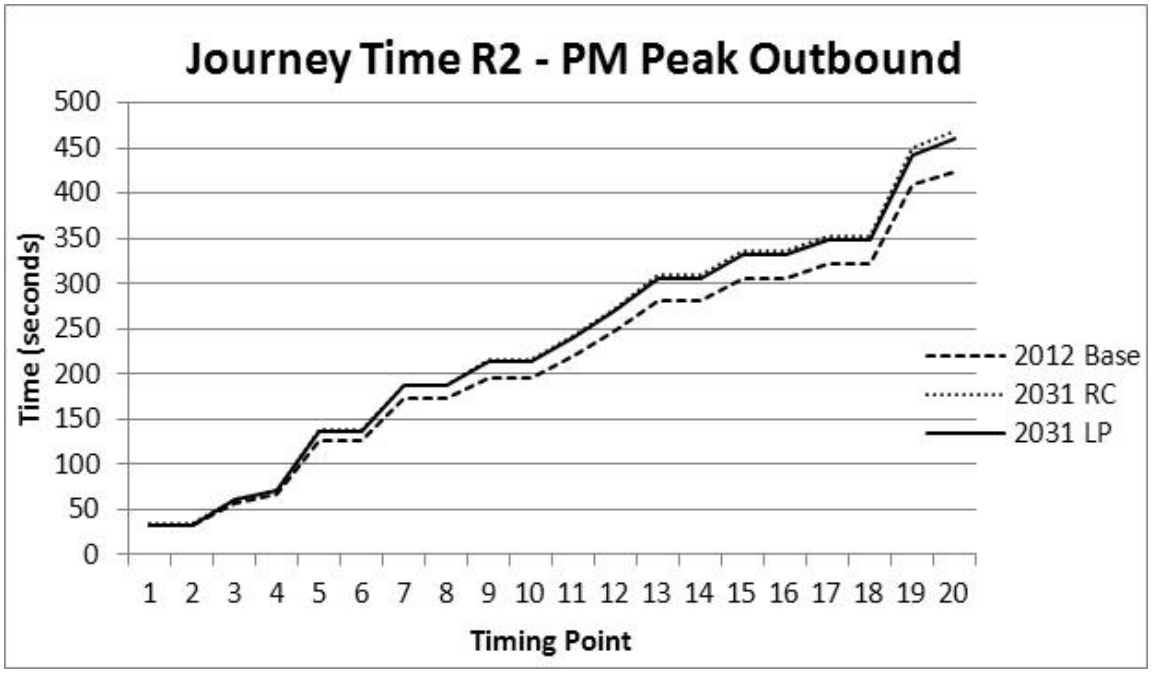
Timing Point
2012 Base
2031 RC
2031 LP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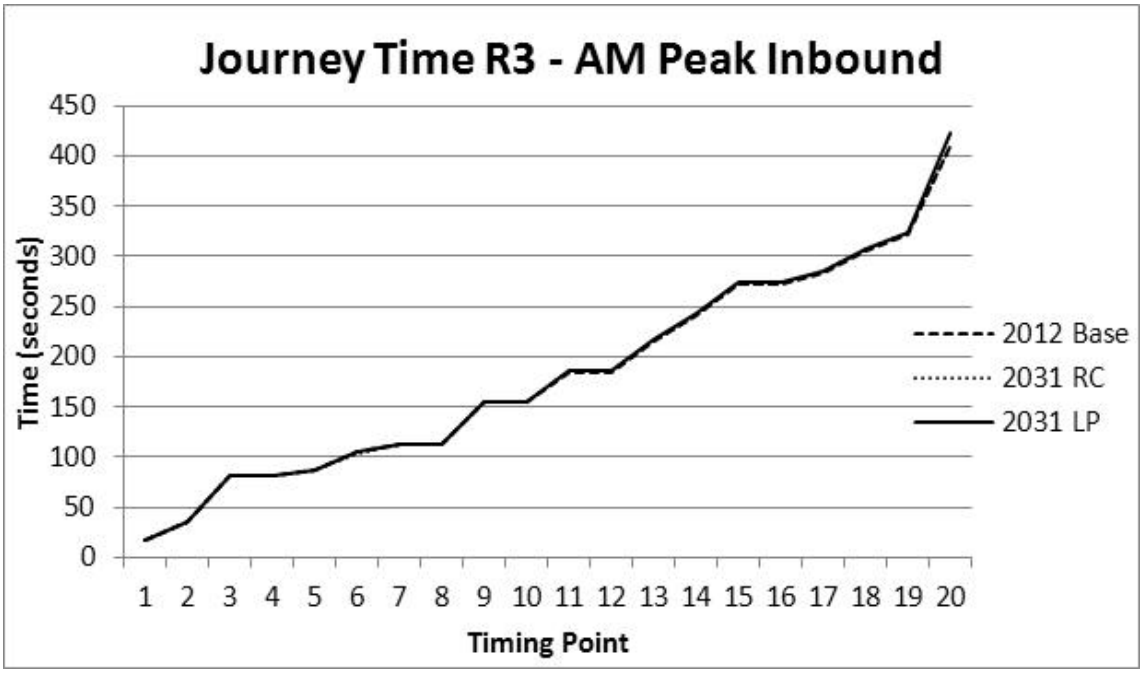
Timing Point
2012 Base
2031 RC
2031 LP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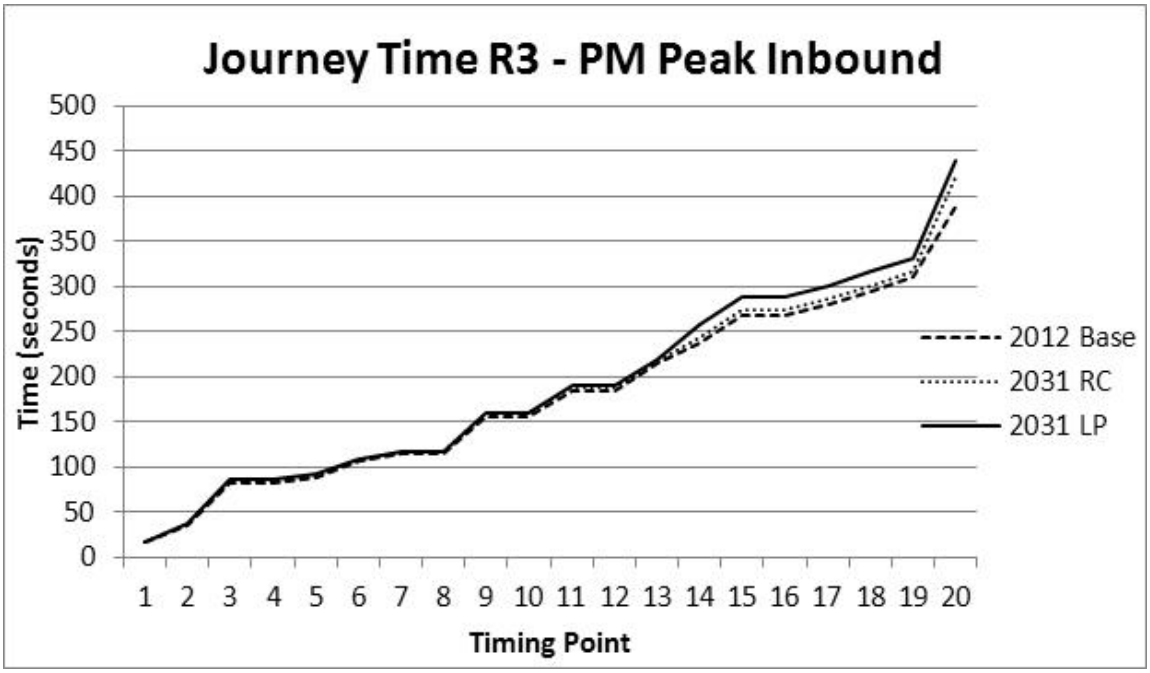
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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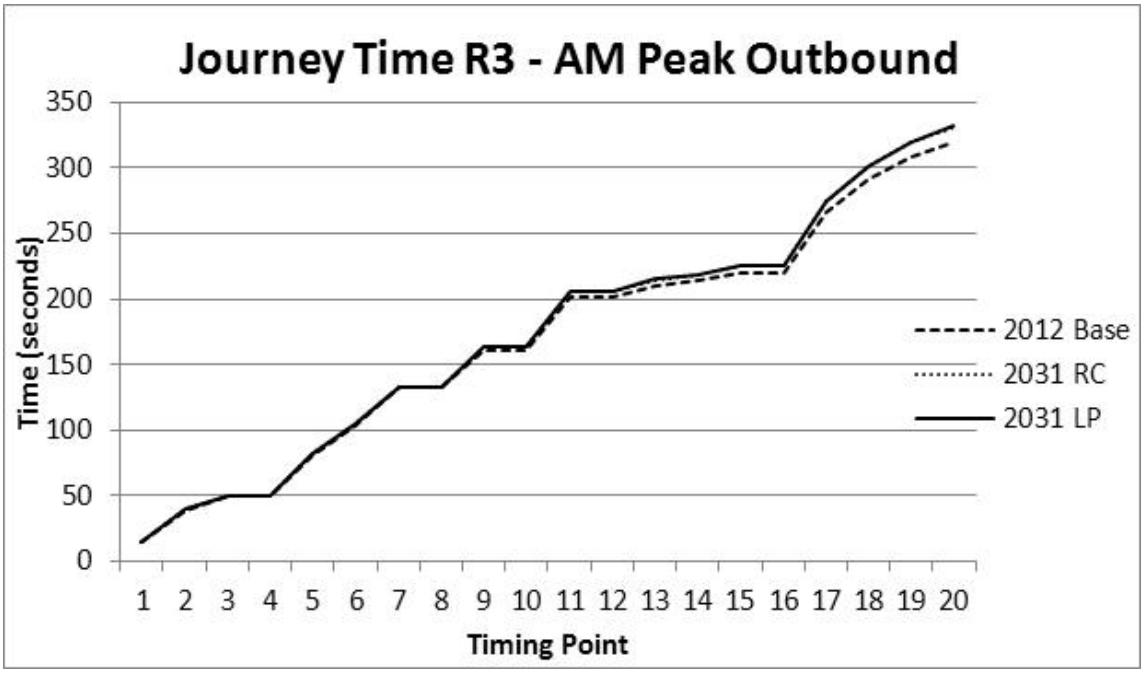
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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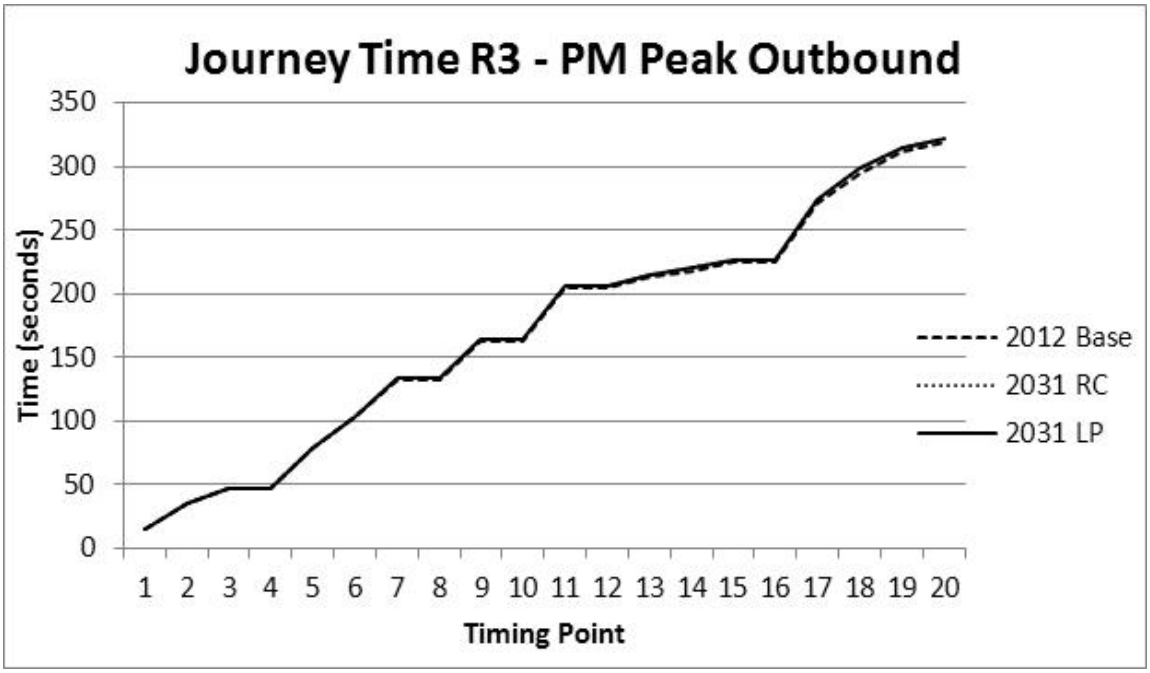
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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300
350
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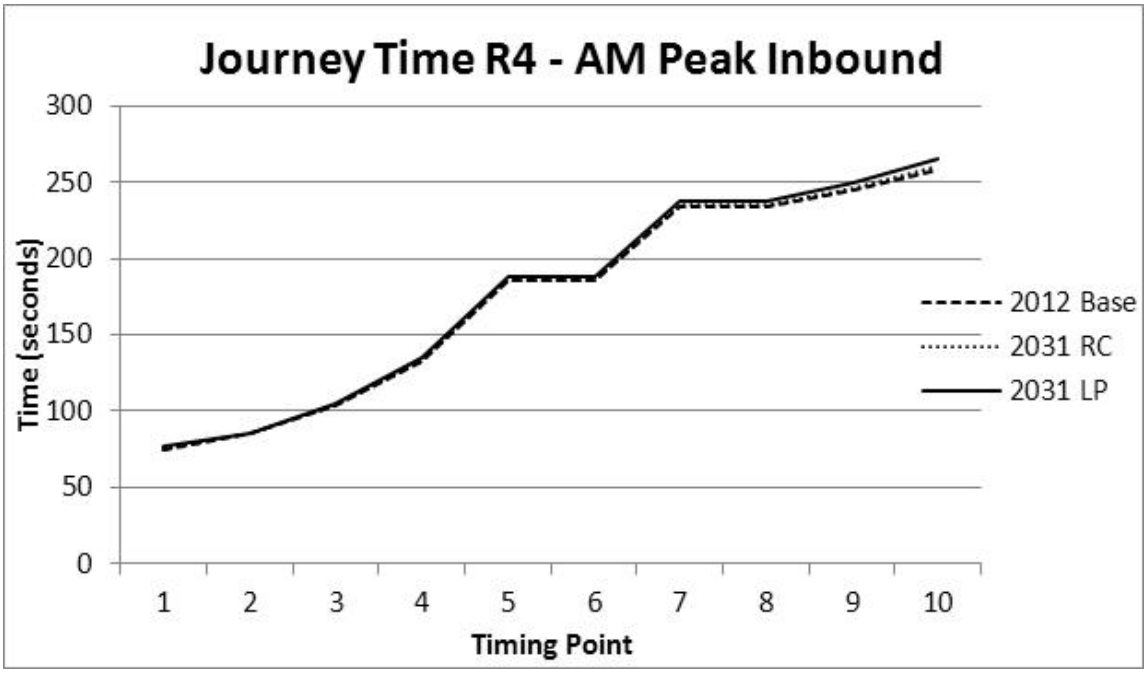
Timing Point
2012 Base
2031 RC
2031 LP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200
150
100
50
0
Time (seconds)
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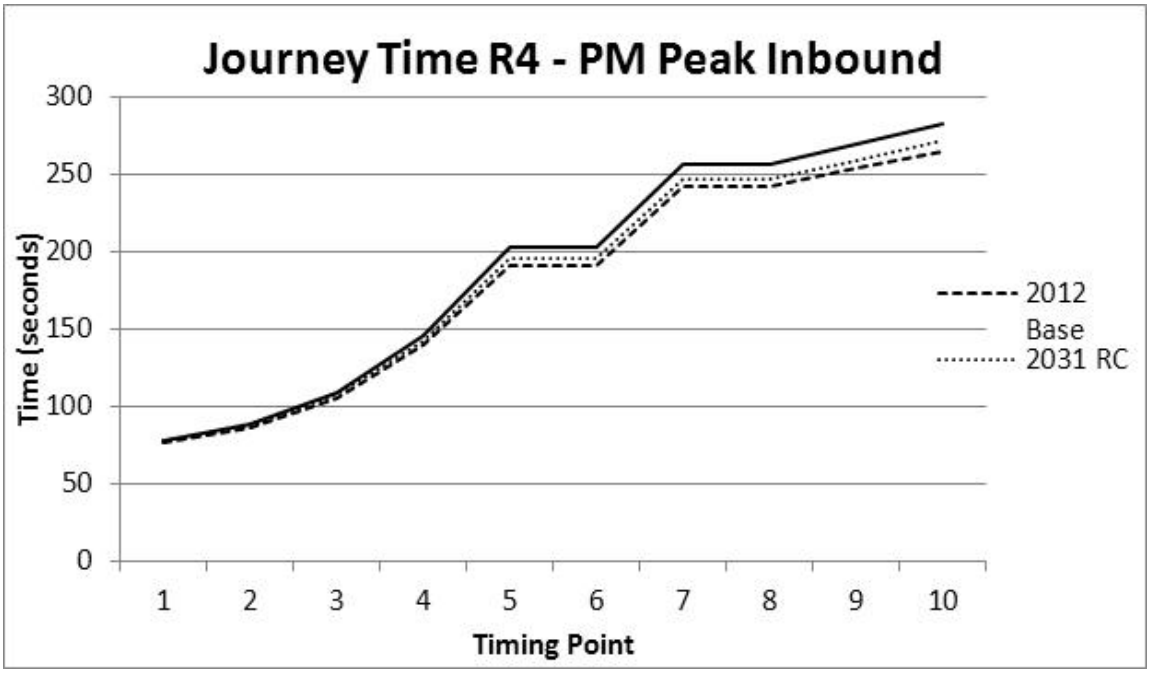
2
3
4
5
6
7
8
9
10
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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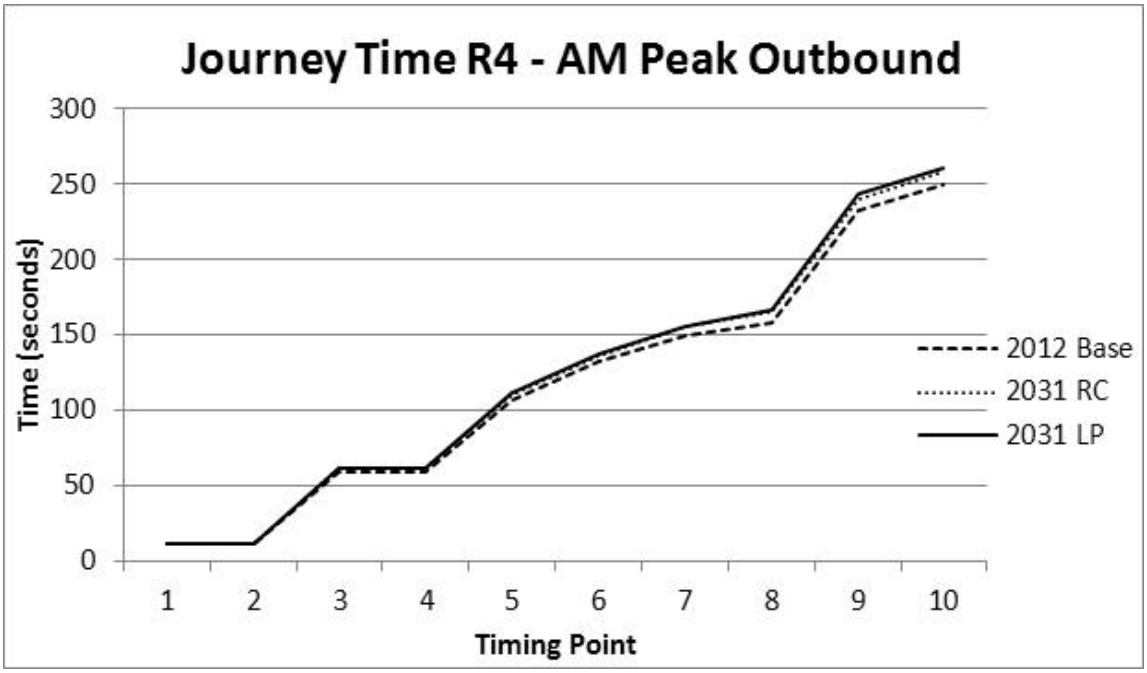
9
10
Timing Point
2012 Base
2031 RC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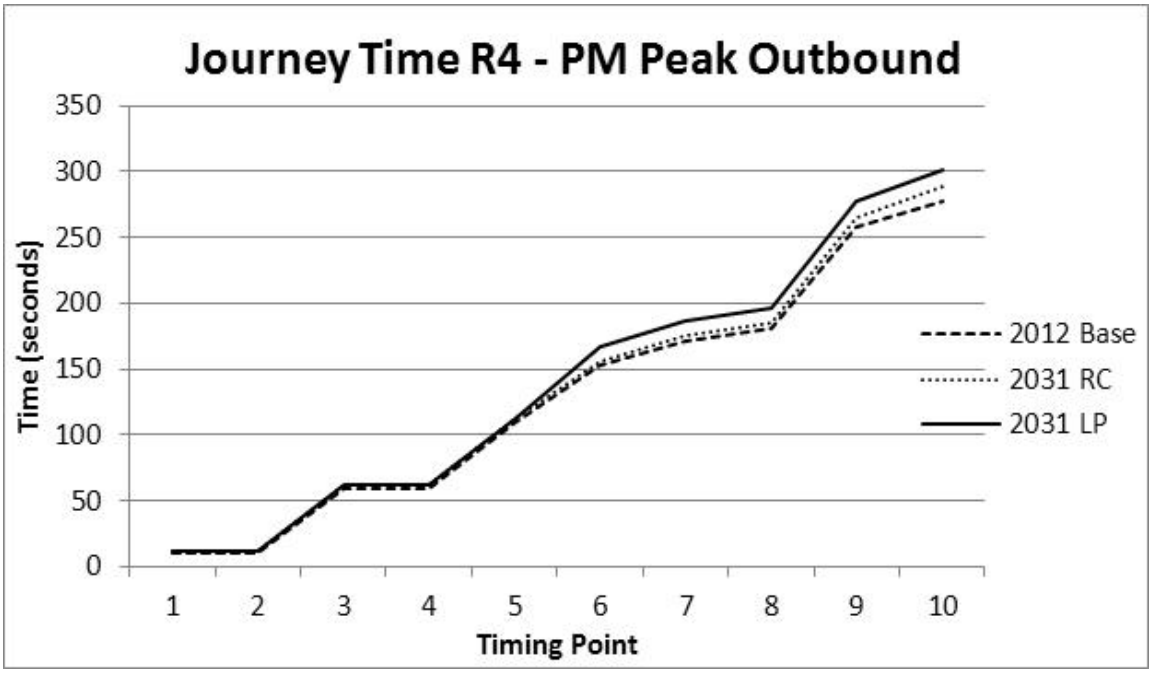
2031 RC
2031 LP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Time (seconds)
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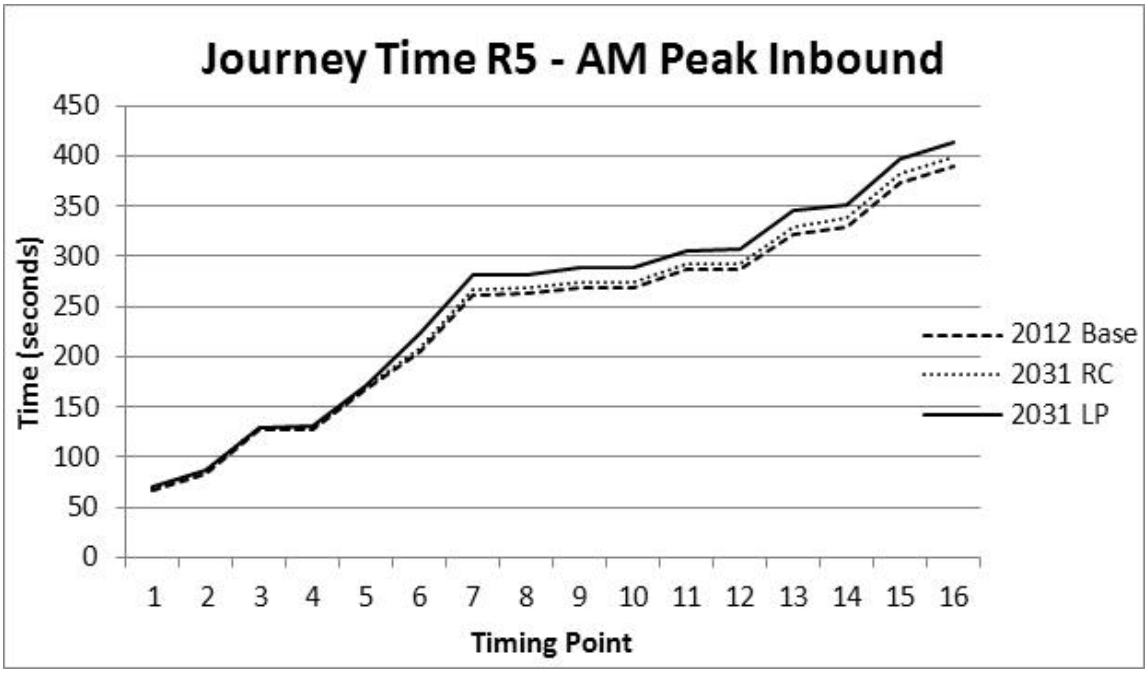
9
10
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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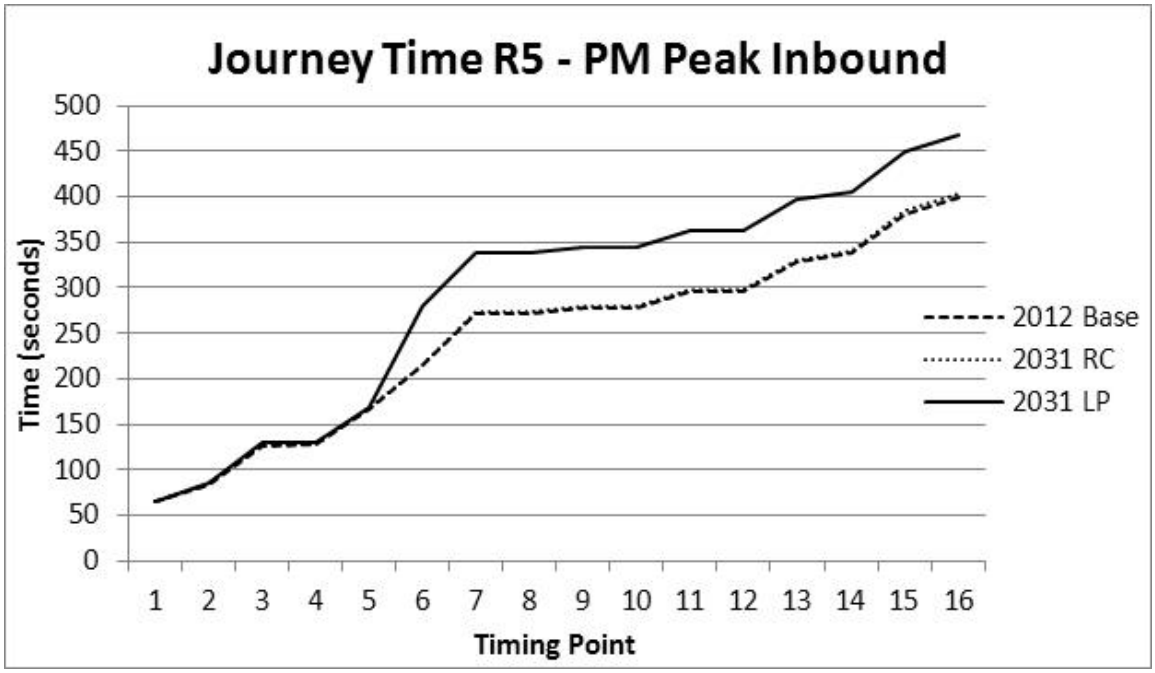
Timing Point
2012 Base
2031 RC
2031 LP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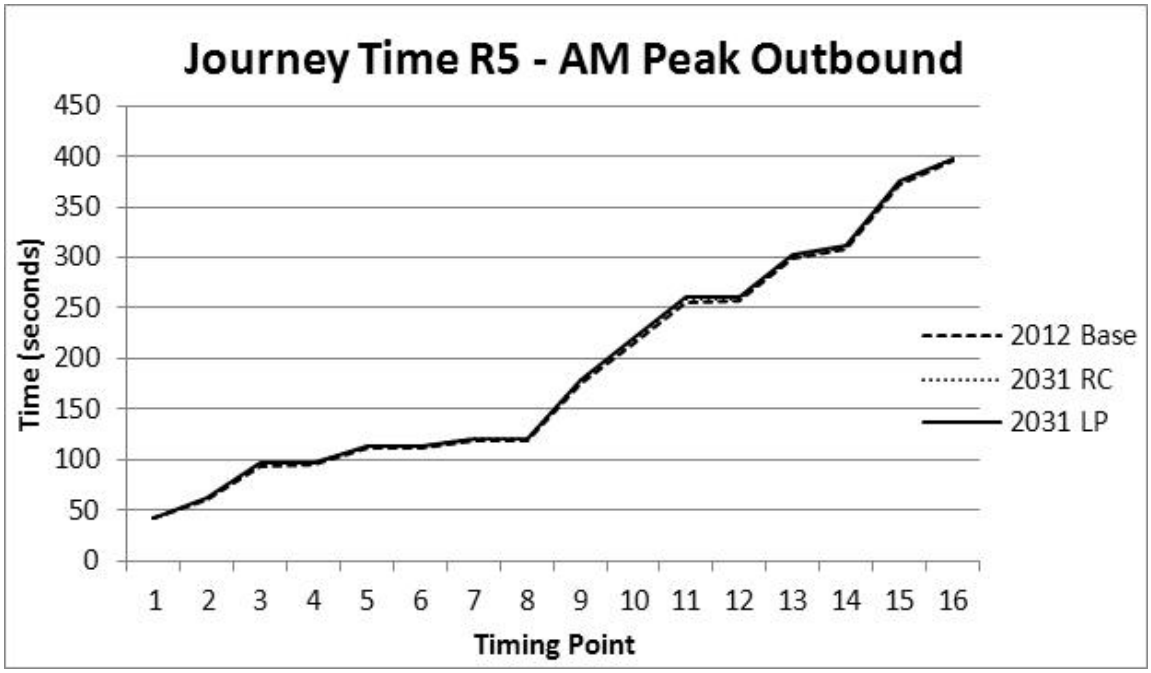
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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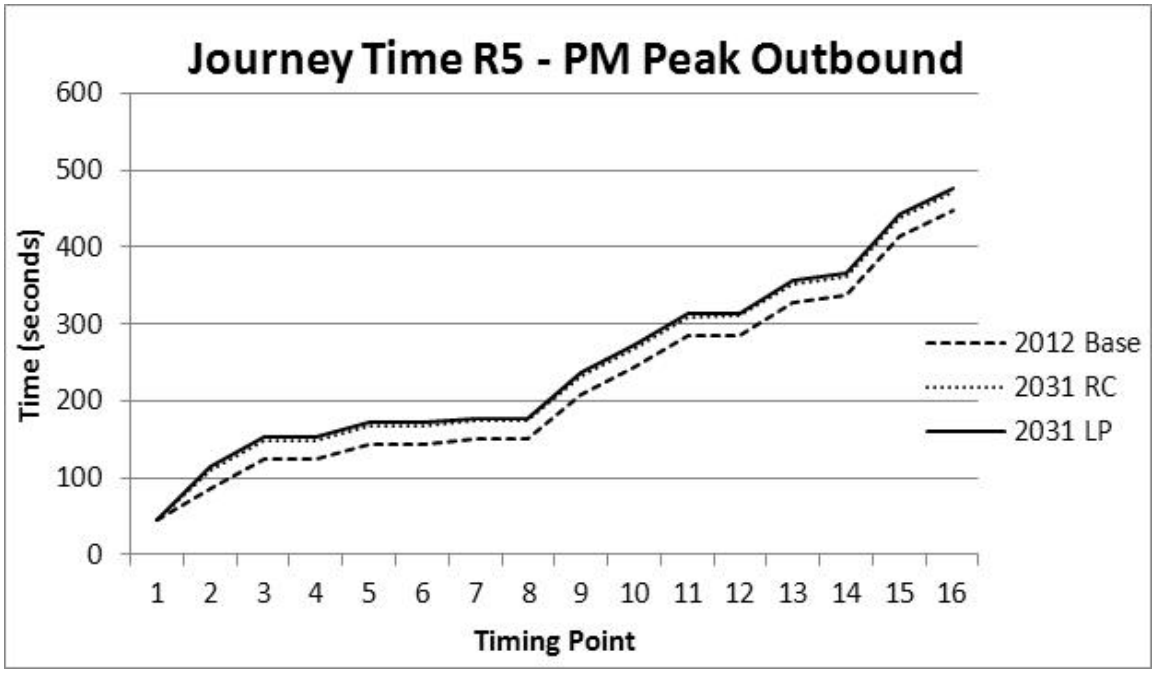
2012 Base
2031 RC
2031 LP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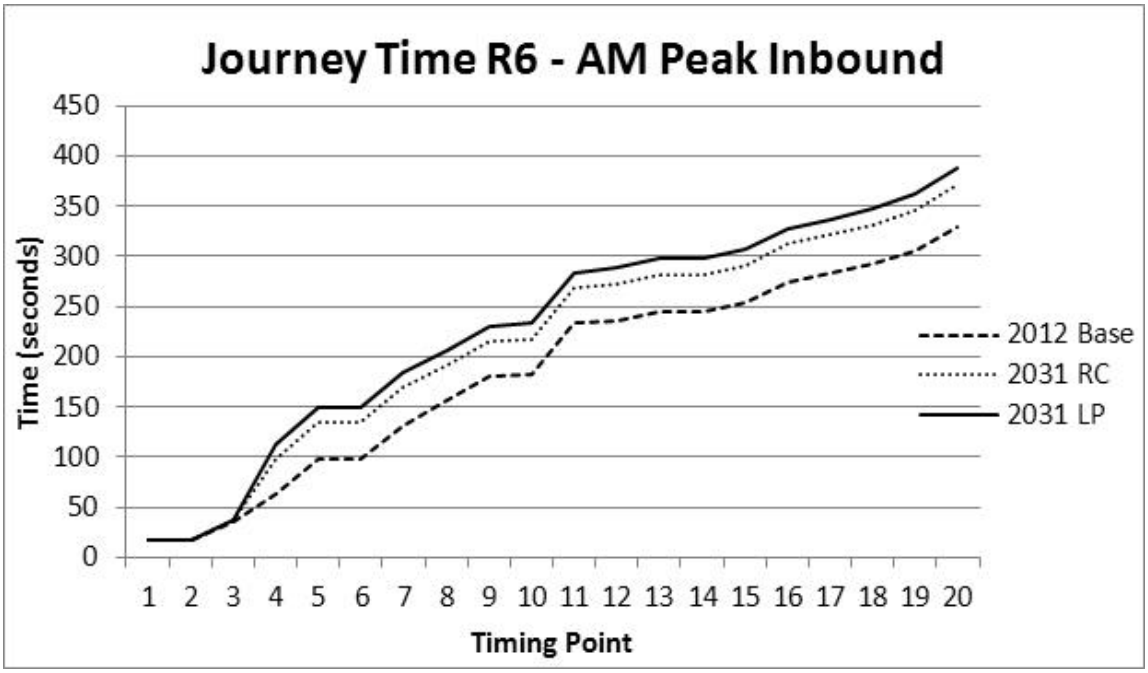
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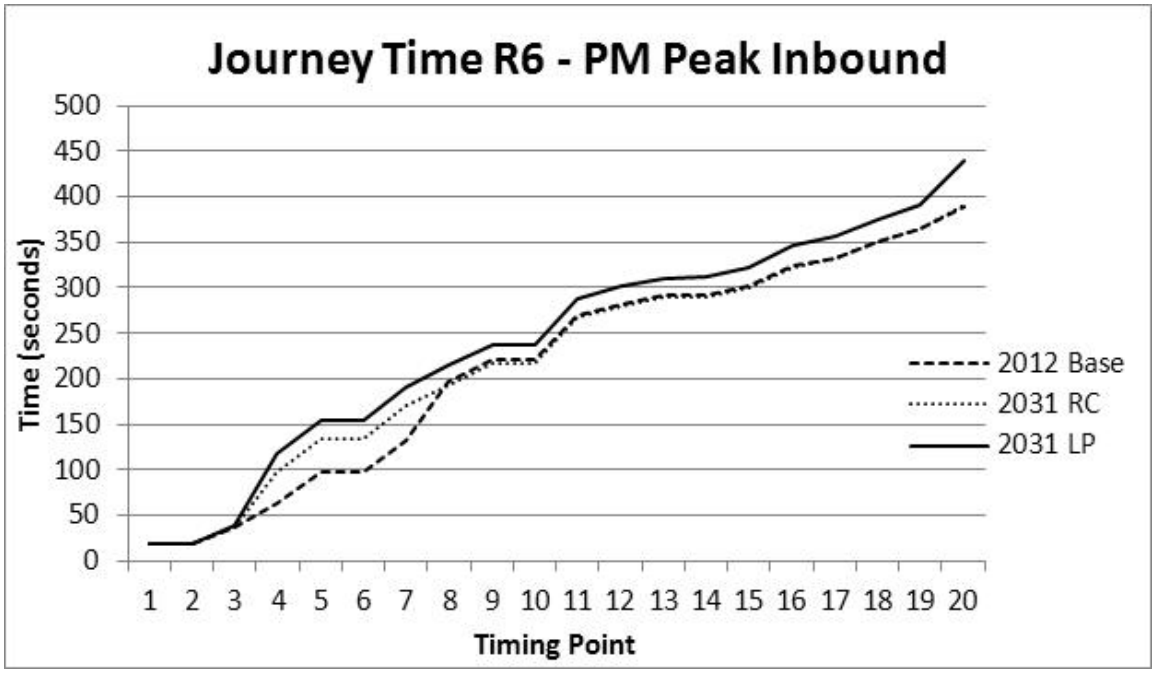
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
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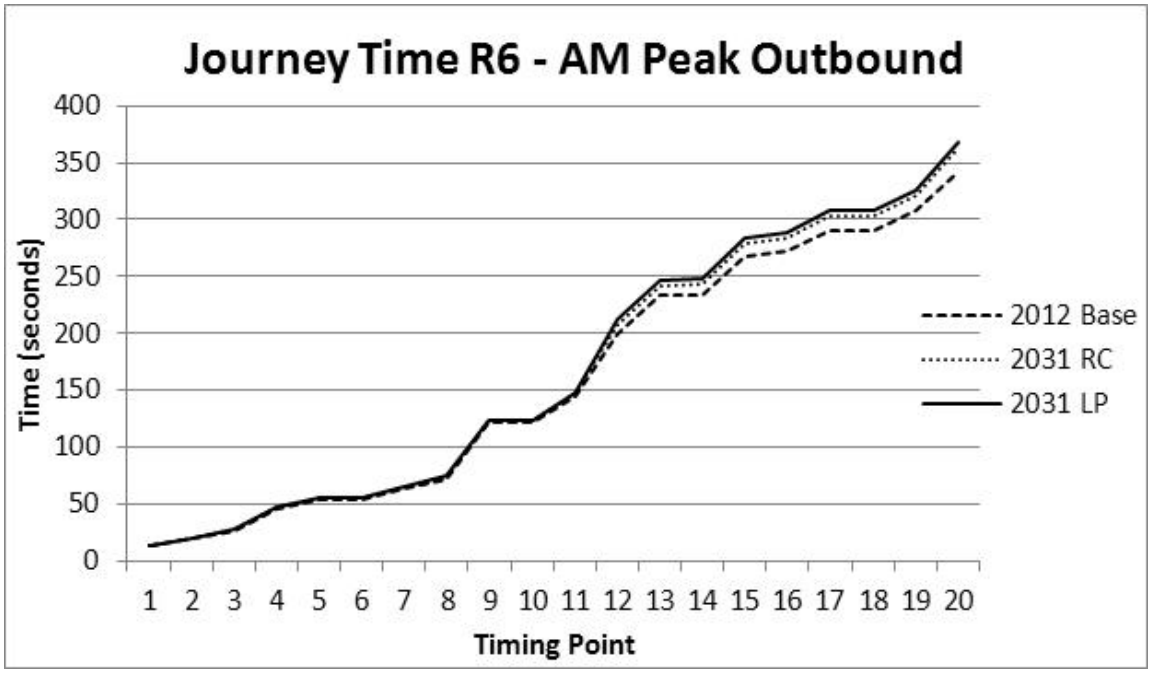
Timing Point
2012 Base
2031 RC
2031 LP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200
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300
350
400
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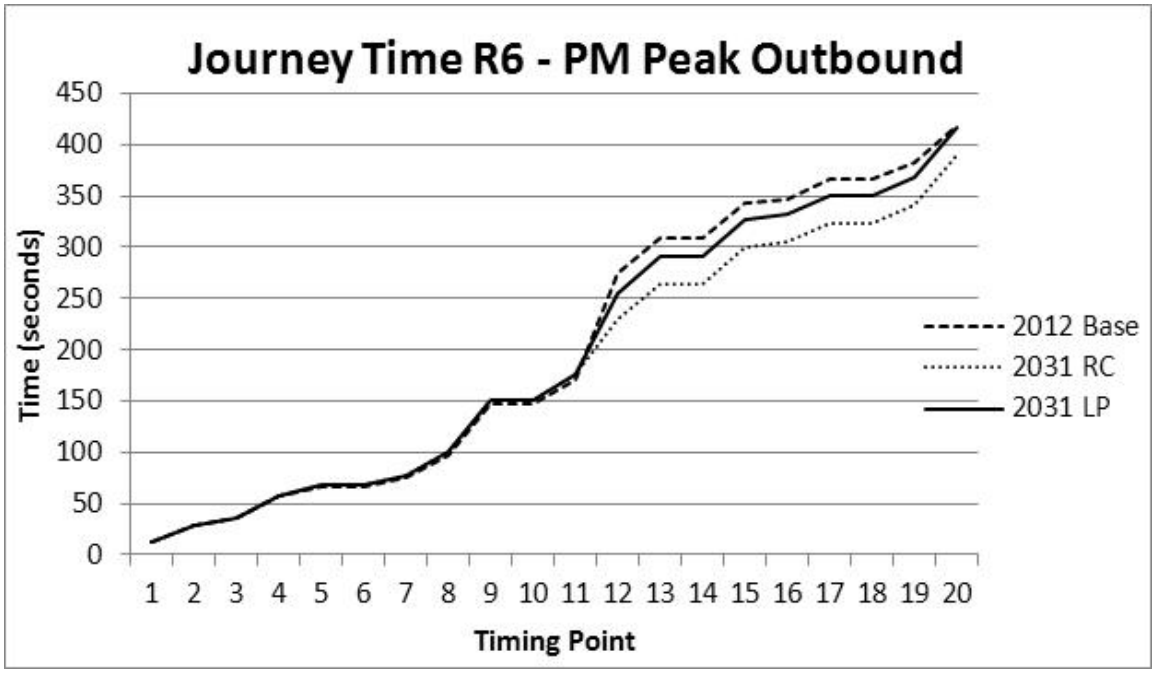
Timing Point
2012 Base
2031 RC
2031 LP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Time (seconds)
0
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150
200
250
300
350
400
450
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Timing Point
2012 Base
2031 RC
2031 LP

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