

**Mansfield
District Council**

Local Plan Consultation Draft

Transport Modelling - Position Statement

January 2016

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Mansfield
District Council



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1 Introduction

1.1 This statement briefly summarises the transport modelling undertaken to assess the cumulative traffic impact of the local plan proposals in the consultation draft plan published in January 2016. It describes the methodology and results of the work undertaken in the Mansfield District Transport Study: Stage 1 and Stage 2 (the 'Study') including the possible measures which have been identified to mitigate the impact of the local plan growth.

1.2 In addition, the statement highlights the next steps in the transport assessment process which may be required to fully assess the impact of the local plan proposals as we move forward to the next publication draft stage of the local plan. In particular, this relates to the need for further transport modelling work to consider any changes made to the spatial distribution of growth that will be put forward at the Publication Draft Plan. This will include the cumulative impact of the development of housing sites on the urban fringe that were not considered within the transport modelling published in January 2015.

2 Methodology

2.1 The transport modelling in the Study has been undertaken using Nottinghamshire County Council's Mansfield traffic model which covers the Mansfield urban area, and traffic count data in the Market Warsop urban area.

Mansfield traffic model

2.2 The Mansfield traffic model ('the model') is a strategic SATURN (Simulation and Assignment of Traffic in Urban Road Networks) traffic model of the Mansfield urban area and its immediate surroundings extending into neighbouring Ashfield district.

2.3 The model covers the morning and evening weekday periods of 8-9am and 5-6pm and considers car, light goods vehicle (van) and heavy goods vehicle trips. Each type of vehicles is assigned to the highway network to allow the different vehicles to be routed through the network along suitable paths.

2.4 The model was originally developed using traffic data with a base year of 2007 and has subsequently been updated to a base year of 2012. The 2012 update of the model included updating the highway network and travel demand. Following the update, the model outputs were compared against observed traffic count data to validate the results of the model.



2.5 The validation involved using data from an independent set of more recent traffic counts including a new set of counts at junctions across the district commissioned as part of the study in July 2012. After a series of adjustments it was concluded that the 2012 model update provided a suitable basis for the further transport modelling.

2.6 Further information on the Mansfield traffic model and the detail of the 2012 update are provided in the Appendix B of the Mansfield District Transport Study - Stage 1: Baseline and Reference Case published in October 2014.

Traffic forecasting

2.7 As stated above, the SATURN model was updated to a 2012 base year to provide a current picture of how the highway network is performing. Using the 2012 base the Study considered the following future year scenarios (see section 3 for more details):

- 2031 Reference Case
- 2031 Local Plan Growth

2.8 These future year scenarios contained various assumptions relating to the potential changes to the highway network and travel demand. Traffic growth was applied to the baseline to account for forecast changes in traffic demand.

2.9 No future year highway schemes were identified which would have major impact upon existing network capacity. However, some of the committed development had associated highway infrastructure as part of the development and these changes were included in the model. These generally took the form of site accesses for specific developments including the following major development sites:

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

2.10 The traffic demand related to specific development sites was added to the model. This involved estimating the traffic demand of each development and distributing these trips across zones in the model. More details on the distribution and assignment of trips can be found in Appendix D of the Mansfield District Transport Study - Stage 1: Baseline and Reference Case published in October 2014.

2.11 The model outputs were used to assess the impact of the above development scenarios in paragraph 2.9. The model outputs include vehicle flows, forecast junction capacity and delays on the highway network. The outputs from the model have been used to inform a number of possible transport mitigation measures.

3 Development scenarios

3.1 The following future year demand scenarios were considered as part of the study.

- i. 2031 Reference Case
- ii. 2031 Local Plan Growth

2031 Reference case

3.2 Scenario i, 2031 Reference Case, includes development which is committed and considered likely to occur by 2031 plus the effects of background traffic growth i.e. growth associated with those trips already on the highway network.

3.3 Specifically, this scenario includes the major housing and commercial developments with planning permission or with council resolution to grant permission subject to s.106 agreements, and other housing sites deemed suitable for housing in the Strategic Housing Land Availability Assessment (SHLAA) as at April 2011.

3.4 The reference case specifically consists of the following assumptions:

- Developments with the benefit of planning permission;
- Developments with the benefit of council resolution to grant permission subject to the signing of S106 agreements;
- Development sites in the pipeline as identified as suitable for housing through the SHLAA.

3.5 The reference case includes a mix of development types including housing, offices, industrial and warehousing and other commercial developments such as retail and leisure.

3.6 The development included in the reference case specifically includes the following:

- 4,881 residential dwellings
- 146,378 square metres of B1/B2/B8 employment development
- 3,970 square metres of A1 food/non-food retail development
- 311 square metres of A3 restaurant/café development
- 3,237 square metres of other commercial development
- a new primary school (D1 Use Class)

3.7 A full list of the development sites is provided in Appendix C of the Mansfield District Transport Study - Stage 1: Baseline and Reference Case published in October 2014. Plans showing the location of the sites included in the reference case are provided in Figures 5.1 and 5.2 of the study.



2031 Local plan growth

3.8 Scenario ii, is the 2031 Local plan growth. As well as the development in scenario i, it includes the development sites proposed within the local plan.

3.9 As some of the local plan proposals will replace existing development the traffic impacts of this development was calculated and removed from the model zones to give a net difference for each development site. This ensured that trip generation rates from the local plan development sites were realistic and did not double count trips already included in the baseline model.

3.10 It should be noted that the local plan growth scenario at this time does not include the proposed 'urban fringe' housing allocations which it has been necessary to identify post publication of the Study. These sites will be assessed as part of the next steps in the local plan process through the preparation of the publication draft plan – see section 6.

3.11 The local plan growth scenario considers specific development sites to be allocated in the local plan up to 2031. Similar to the reference case, it includes a mix of development types. A full list of the local plan development sites included in the local plan growth scenario is provided in Appendix A of the Mansfield District Transport Study - Stage 2: Local Plan Growth published in January 2015.

3.12 The development included in the local plan growth scenario specifically includes the following:

- 2,579 residential dwellings
- c. 15 hectares of B1/B2/B8 employment development
- Mansfield central area proposals, including:
 - 144 residential dwellings
 - 18,775 square metres of A1 food/non-food retail development
 - 39,054 square metres of B1 office development
 - 14,236 square metres of D2 leisure development
 - 13,082 square metres of other commercial development including A2 financial and professional services; A3 restaurant/café development; A4 public house; A5 hot food take-away
 - 30,070 square metres of car parking
- Mansfield Woodhouse district centre proposals, including
 - 2,300 square metres of A1 food/non-food retail development
 - 375 square metres of mixed use development including A1 food/non-food retail development & A3 restaurant/café development
- Market Warsop district centre proposals, including
 - 1,300 square metres of A1 retail food/non-food development

- 320 square metres of D1 leisure development
- 5,200 square metres of mixed use development including A1 food/non-food retail development; A2 financial and professional services; A3 restaurant/café development; A4 public house; A5 hot food take-away; C1 hotel; D2 leisure
- 630 square metres of car parking
- Bellamy Road neighbourhood parade proposals, including
 - 1,076 square metres of A1 retail food/non-food development
 - 1,500 square metres of car parking

Summary of development scenarios

3.13 The forecast traffic demand totals for the Base 2012, Reference Case 2031, and Local Plan Growth 2031 scenarios are shown in Table 3.1. These totals are cumulative, so the Local Plan 2031 totals include traffic demand from the Base Year 2012, and Reference Case 2031.

3.14 As such, the extra trips associated with the local plan growth scenario are added to the Reference Case 2031 forecast. This assumes that all the trips associated with the local plan development sites are new to the network and do not suppress or replace trips within the Base or Reference Cases.

Table 3.1 Forecast traffic demand

Trip demand scenario	Number of trips	
	AM	PM
Base year 2012	29,044	30,685
Reference Case 2031	34,148	36,007
Local Plan 2031	35,282	37,537



3.15 In addition to the above scenarios, forecast trip levels were calculated using the DfT's National Trip End Model (NTEM) growth forecasts. These are shown in Table 3.2.

Table 3.2 Forecast traffic demand using TEMPRO/NTM growth

Trip demand scenario	Number of trips	
	AM	PM
TEMPRO/NTM (to 2031)	34,120	36,282

3.16 The National Trip End Model (NTEM) dataset represents the Department of Transport's standard assumptions about growth in travel demand. Data from NTEM is available at the census output area level and it has been manipulated in relation to the model zones used in the study. Access to the dataset is provided through TEMPRO software.

3.17 TEMPRO version 6.2 was used in the study to calculate growth factors for cars based on the 2031 future year, trip purpose, time period and the origin and destination of trips. For heavy goods vehicles the National Transport Model (NTM) was used using growth factors for the East Midlands region.

3.18 The trip totals for the Reference Case 2031 in Table 3.1 i.e. 34,148 AM peak hour, and 36,007 PM peak hour are numerically similar to the TEMPRO/NTM factored totals in Table 3.2 i.e. 34,120 AM peak hour, and 36,282 PM peak hour.

3.19 This indicates that the additional trips generated by the committed development sites plus the effects of background traffic growth are compatible with the growth forecasts produced by the DfT's national travel models. In this regard, it has not been necessary to 'top up' the local plan growth scenario to match the traffic growth benchmarks set by the NTEM. More detail on the forecasts can be found in Appendix D of the Mansfield District Transport Study - Stage 1: Baseline and Reference Case published in October 2014.

3.20 The 2031 Local Plan growth represents an increase of trips equal to 6,238 trips per hour (21%) in the AM peak hour and 6,852 trips (22%) in the PM peak compared to the 2012 Base. The 2031 Local Plan growth 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.

4 Results

4.1 The forecast scenarios were created by making adjustment to the highway network to include new accesses and internal link roads, applying traffic growth and including additional development traffic to the validated SATURN Mansfield traffic model.

4.2 The results of the forecast scenarios were then analysed. The model outputs include traffic flows, delays and the Ratio of Flow Volume (V) to Capacity (C) for junctions in the model (V/C).

4.3 The V/C of a road or junction is a measure of the traffic at the junction in relation to its ability to accommodate such traffic flow i.e. it is a measure of congestion. A junction with a capacity of 1,000 vehicles per hour and a traffic demand of 850 vehicles per hour has a V/C of 0.85 (or 85%).

4.4 The V/C is calculated by summing all the approach flows into a junction and dividing the total available capacity on all approaches to the junction. A V/C value above 85% is likely to produce queues on some occasions during the peak hours. A junction is defined as at capacity if it has a V/C value of 100%.

4.5 Being a network-wide model, the representation of junctions in SATURN is more limited than for junction specific software. As such, those junctions identified as operating above 0.75 (or 75%) in the SATURN model were assessed in more detail using industry standard software for measuring the performance of isolated junctions. Specifically, this included the use of:

- LINSIG3 – to identify the performance of signalised junctions;
- Assessment of Roundabout Capacity and Delay (ARCADY) – to identify the performance of roundabout junctions; and
- Priority Capacity and Delay (PICADY) – to identify the performance of priority junctions.

4.6 The following sections summarise the traffic flows, journey time and V/C results from the modelling of the highway network.

2012 Base results

4.7 The 2012 Base model represents the latest conditions on the Mansfield highway network. The results are taken directly from the validated model and more detailed junction modelling using the above software.

Congestion (V/C ratio)

4.8 A summary of overall junction performance across the highway network covering the Mansfield urban area is provided in Table 4.1. This gives the total number of junctions in the model with a V/C greater than 75% but less than 85%, and those approaching capacity, with a V/C greater than 85% but less than 100%, and those over capacity, with a V/C greater than 100%.

**Table 4.1 2012 Base - junction performance results from SATURN**

V/C Ratio	Morning peak	Afternoon peak
No junctions with > 75% V/C < 85%	2	5
No. junctions with > 85% V/C < 100%	1	0
No. junctions with V/C > 100%	0	1

4.9 The SATURN model results show that in the morning peak there is one junction approaching capacity, and in the afternoon peak there is one junction operating over capacity. These are different junctions.

4.10 The detailed junction modelling as detailed in paragraph 4.5 was undertaken. This provided the following results:

Table 4.2 2012 Base - junction performance results from detail modelling

Junction	Morning peak hour	Afternoon peak hour
Chesterfield Road / Debdale Ln	Near to or at capacity	Over capacity
A60 Nottingham Road / Berry Hill Ln	√	√
Carter Ln / Southwell Rd / Windsor Rd	√	√
A60 Leeming Ln / New Mill Ln	√	Near to or at capacity
A617 MARR / A6191 Southwell Rd	√	√
A60 Leeming Ln / Peafield Ln	√	√
A38 Sutton Rd / Skegby Ln	Near to or at capacity	√
A60 Church St / Wood St	√	√
√ - Indicates that the operational performance of the junction would be acceptable; i.e. V/C less than 0.85 for a roundabout or Degree of Saturation less than 0.9 for a traffic signal junction.		

Traffic Flows

4.11 A summary of traffic flows across the network in the 2012 Base is shown in Figures 4.3 & 4.4 of the Stage 1 report published in October 2014. A summary of the routes with the highest traffic flows i.e. between 2,000 and 3,000 PCU's is provided in Table 4.3.

Table 4.3 2012 Base - traffic flow results from SATURN (2000-3000 PCU's)

Route	Morning peak hour	Afternoon peak hour
A38 Sutton Rd (nr. Kings Mill)		
A38 Sutton Rd (nr. B6014 Skegby Ln)		
A6191 Southwell Rd West (between Bellamy Rd jct. & A617 roundabout)		
A617 (between A60 jct. & A6117 roundabout)		
A60 Leeming Lane North (between Marples Rd jct. & A6075 Warsop Rd)		
A617 Chesterfield Rd between Pleasley Hill roundabout & A6009 Rosemary St)		
A6075 Abbott Rd (between A617 jct. & Water Ln jct.)		
Passenger Car Units. 1 Car = 1 PCU / 1 Bus = 2 PCU's Yellow = 2,000 – 3,000 PCU's; Green = <2,000 PCU's		



Traffic Delays

4.12 A summary of journey time performance in terms of delays across the network in the 2012 Base is shown in Figures 4.5 & 4.6 of the Stage 1 report published in October 2014. A summary of the routes with the greatest traffic delays i.e. >60 seconds is provided in Table 4.4. Elsewhere the modelling shows that traffic experiences smaller delays i.e. between 0 to 60 seconds.

Table 4.4 Base - traffic delay results from SATURN (>60secs)

Route	Morning peak hour	Afternoon peak hour
Clipstone Rd West (between A6117 jct. & George St jct.)		
B6030 Carter Ln (between Skerry Hill jct. & A6191 Southwell Rd West jct.)		
B6030 Windsor Rd (between Southwell Rd West jct. & Berry Hill Ln jct.)		
A60 Nottingham Rd (between Berry Hill Ln jct. & B6030 Forest Rd)		
A60 Nottingham Rd (between Portland St jct. & St Peters Way)		
A6191 Ratcliffe Gate		
A6009 St Peters Way (between Ratcliffe Gate jct. & Bath Ln jct.)		
A6191 Southwell Rd West (between Oak Tree Ln jct. & Bellamy Rd jct.)		
A38 Sutton Rd (nr. Kings Mill)		
Chesterfield Rd South (between A6009 Rosemary St jct. & Clumber St jct.)		
A6075 Abbott Rd (between A617 jct. & Water Ln jct.)		
A607 Debdale Ln (between A617 jct. & Balmoral Dr jct.)		
A60 Leeming Lane South (between New Mill Ln jct. & A6075 Warsop Rd jct.)		
A6075 Welbeck Rd (between Portland St jct. & Church St jct.)		
A617 Chesterfield Rd North (between Pleasley Hill roundabout & MARR jct.)		
Yellow = >60 seconds delay; Green = <60 seconds delay		

4.13 The results show that there are existing delays on sections of key routes across the Mansfield urban area, although these are not excessive.

2031 Reference Case results

4.14 The 2031 Reference Case consists of completed developments, committed developments and sites in the pipeline as identified through SHLAA.

Congestion (V/C Ratio)

4.15 A summary of overall junction performance across the highway network covering the Mansfield urban area is provided in Table 4.5. This gives the total number of junctions in the model with a V/C greater than 75% but less than 85%, and those approaching capacity, with a V/C greater than 85% but less than 100%, and those over capacity, with a V/C greater than 100%.

Table 4.5 2031 Reference Case - junction performance results from SATURN

V/C Ratio	Morning peak	Afternoon peak
No junctions with > 75% V/C < 85%	3	5
No. junctions with > 85% V/C < 100%	3	1
No. junctions with V/C > 100%	0	2

4.16 The SATURN model results show that in the morning peak there are three junctions approaching capacity, and in the afternoon peak there is one junction approaching capacity i.e. >85% V/C <100%, and two junctions operating over capacity V/C 100%. These latter two junctions are the same ones which operate close to capacity in the morning peak.

4.17 The detailed junction modelling as detailed in paragraph 4.5 was undertaken. This provided the following results in the 2031 Reference Case:

Table 4.6 2031 Reference Case- junction performance results from detailed modelling

Junction	Morning peak hour	Afternoon peak hour
Chesterfield Road / Debdale Ln	Over capacity	Over capacity
A60 Nottingham Road / Berry Hill Ln	Over capacity	Near to or at capacity
Carter Ln / Southwell Rd / Windsor Rd	Over capacity	Near to or at capacity
A60 Leeming Ln / New Mill Ln	Near to or at capacity	Over capacity
A617 MARR / A6191 Southwell Rd	√	√
A60 Leeming Ln / Peafield Ln	√	√
A38 Sutton Rd / Skegby Ln	Near to or at capacity	Near to or at capacity
A60 Church St / Wood St	Near to or at capacity	Over capacity
√ - Indicates that the operational performance of the junction would be acceptable; i.e. V/C less than 0.85 for a roundabout or Degree of Saturation less than 0.9 for a traffic signal junction.		



Traffic Flows

4.18 A summary of traffic flows across the network in the 2031 Reference Case is shown in Figures 5.3 & 5.4 of the Stage 1 report published in October 2014. A summary of the routes with the highest traffic flows i.e. over 3,000 PCU's, and between 2,000 and 3,000 PCU's is provided in Tables 4.7.

Table 4.7 2031 Reference Case - traffic flow results from SATURN

Route	Morning peak	Afternoon peak	Morning peak	Afternoon peak
A617 (between A60 jnct. & A6117 roundabout)	Red	Green	Green	Yellow
A617 Chesterfield Rd North (between Pleasley Hill roundabout & MARR jnct.)	Green	Red	Green	Green
A38 Sutton Rd (nr. Kings Mill)	Green	Green	Yellow	Yellow
A60 Nottingham Rd (between A617 jnct & Portland Street)	Green	Green	Yellow	(to Berry Hill Ln jnct.)
A6009 St Peters Way (between Bath Ln jnct. & Ratcliffe Gate jnct.)	Green	Green	Yellow	Green
A6191 Southwell Rd West (between A617 roundabout & Oak Tree Ln jnct.)	Green	Green	Yellow	(to Sherwood Av jnct.)
Oak Tree Lane (between A6191 jnct. & Jubilee Way South jnct.)	Green	Green	Yellow	Yellow
A60 Leeming Lane North (between Marples Rd jnct. & A6075 Warsop Rd jnct.)	Green	Green	Yellow	Yellow
Pump Hollow Rd / Violet Hill	Green	Green	Green	Yellow
A617 Chesterfield Rd North / South (between MARR jnct. & A60 Woodhouse Rd jnct.)	Green	Green	Green	Yellow
A6075 Debdale Ln (between A617 jnct. & Sherwood Rise jnct.)	Green	Green	Green	Yellow
A6075 Abbott Rd (between A617 jnct. & Water Ln jnct.)	Green	Green	Green	Yellow
A6075 Abbott Rd (between A617 jnct. & Brick Kiln Ln)	Green	Green	Green	Yellow
Red = >3,000 PCU's; Yellow = 2,000-3,000 PCU's; Green <2,000 PCU's				

4.19 The results show that there are sections of two key routes with expected traffic flows over 3,000 PCU's . In addition, there is a greater number and length of routes across the network that experience traffic flows between 2,000 and 3,000 PCU's in the 2031 Reference Case compared with the 2012 Base.

Traffic delays

4.20 A summary of journey time performance in terms of delays across the network in the 2031 Reference Case is shown in Figures 5.5 & 5.6 of the Stage 1 report published in October 2014. A summary of the routes with the greatest traffic delays i.e. >60 seconds is provided in Table 4.8. Elsewhere traffic experiences smaller delays i.e. between 0 to 60 seconds.

Table 4.8 2031 Reference Case - traffic delay results from SATURN

Route	Morning peak hour	Afternoon peak hour
Clipstone Rd West (between A6117 jnct. & George St jnct.)		
B6030 Carter Ln (between Skerry Hill jnct. & A6191 Southwell Rd West jnct.)		
B6030 Windsor Rd (between Southwell Rd West jnct. & Berry Hill Ln jnct.)		
A60 Nottingham Rd (between A611 jnct. & Old Newark Rd jnct.)		
A60 Nottingham Rd (between Berry Hill Ln jnct. & B6030 Forest Rd)		
A60 Nottingham Rd (between Portland St jnct. & St Peters Way)		
A6191 Ratcliffe Gate		
A6009 St Peters Way (between Bath Ln jnct. & Ratcliffe Gate jnct.)	(to Nottingham Rd jnct.)	
A617 Rainworth By-pass (inbound)		
B6020 Southwell Road East (between A617 MARR roundabout & Helmsey Rd)		
Oak Tree Ln (between A6191 Jnct. & Oakwood Rd)		
A60 Leeming Ln North / South (between Peafield Ln jnct. & New Mill Ln Jnct.)		
A6191 Southwell Rd West (between Oak Tree Ln jnct. & Bellamy Rd jnct.)		(to Sherwood Ave)
A38 Sutton Rd (nr. Kings Mill)		
Chesterfield Rd South (between A6009 Rosemary St jnct. & Clumber St jnct.)		
A6075 Abbott Rd (between A617 jnct. & Water Ln jnct.)		
A607 Debdale Ln (between A617 jnct. & Balmoral Dr jnct.)		
A60 Leeming Lane South (between New Mill Ln jnct. & A6075 Warsop Rd jnct.)		
A6075 Welbeck Rd (between Portland St jnct. & Church St jnct.)		
A617 Chesterfield Rd North (between Pleasley Hill roundabout & MARR jct.)		
A38 Sutton Rd (between A6114 Skegby Ln jnct. & Botany Av jnct.)		
A6117 Adamsway (between A6191 Southwell Rd East to Bellamy Rd roundabout)		
Yellow = >60 secs delay; Green = <60 secs delay		



4.21 The results show that there are a greater number and length of sections of key routes that suffer from delays across the network serving the Mansfield urban area.

2031 Local Plan growth results

4.22 The 2031 Local Plan growth scenario consists of the development of a range of sites within Mansfield, and Market Warsop urban areas, in addition to the development included in the 2031 Reference Case.

Congestion (V/C Ratio)

4.23 A summary of overall junction performance across the highway network covering the Mansfield urban area is provided in Table 4.9. This gives the total number of junctions in the model with a V/C greater than 75% but less than 85%, and those approaching capacity, with a V/C greater than 85% but less than 100%, and those over capacity, with a V/C greater than 100%.

Table 4.9 2031 Local Plan - junction performance results from SATURN

V/C Ratio	Morning peak	Afternoon peak
No junctions with > 75% V/C < 85%	3	5
No. junctions with > 85% V/C < 100%	4	3
No. junctions with V/C > 100%	0	2

4.24 The SATURN model results show that in the morning peak there are four junctions approaching capacity, and in the afternoon peak there are three junctions approaching capacity, and two junctions operating over capacity. These latter two junctions are the same ones which are approaching capacity in the morning peak.

4.25 The detailed junction modelling as detailed in paragraph 4.5 was undertaken. This provided the following results in the 2031 Local Plan:

Table 4.10 2031 Local Plan - junction performance results from detailed modelling

Junction	Morning peak hour	Afternoon peak hour
Chesterfield Road / Debdale Ln	Over capacity	Over capacity
A60 Nottingham Road / Berry Hill Ln	Over capacity	Over capacity
Carter Ln / Southwell Rd / Windsor Rd	Near to or at Capacity	Over capacity
A60 Leeming Ln / New Mill Ln	Over capacity	Over capacity
A617 MARR / A6191 Southwell Rd	√	√
A60 Leeming Ln / Peafield Ln	√	Near to or at Capacity
A38 Sutton Rd / Skegby Ln	√	Over capacity
A60 Church St / Wood St	Over capacity	Over capacity
A60 Leeming Ln / A6075 Warsop Rd	Over capacity	Over capacity
√ - Indicates that the operational performance of the junction would be acceptable; i.e. V/C less than 0.85 for a roundabout or Degree of Saturation less than 0.9 for a traffic signal junction.		

Traffic Flows

4.26 A summary of traffic flows across the network in the 2031 Reference Case is shown in Figures 2.3 & 2.4 of the Stage 2 report published in January 2015. In addition, the aggregate traffic flow impact of the local plan development sites is shown in Figures 2.5 & 2.6.

4.27 The results show traffic flow changes of no more than 10% from the 2031 Reference Case across most parts of the network. This is considered to have no overall or discernible traffic impact upon the highway network. The other routes with larger traffic flow increases i.e. 10% to 30%+ are provided in Table 4.11:

**Table 4.11 2031 Local Plan - traffic flow differences between 2031 RC & 20R**

Route	Morning peak	Afternoon peak
A6075 Warsop Rd	Green	Yellow
A60 Leeming Ln North / South	Yellow	Yellow
A6117 Old Mill Lane	Yellow	Green
Sandlands Way	Green	Yellow
Sandy Ln	Yellow	Yellow
Skerry Hill	Yellow	Green
B6032 Mansfield Rd	Green	Yellow
B6033 Bath Ln	Yellow	Yellow
B6033 Ravensdale Rd	Green	Yellow
A60 Nottingham Rd	Green	Yellow
Berry Hill Rd	Green	Yellow
Caudwell Rd	Yellow	Green
Quarry Ln	Yellow	Green
Brick Kiln Ln	Yellow	Green
A6075 Abbott Rd	Yellow	Green
Ladybrook Ln	Yellow	Yellow
Bancroft Ln	Yellow	Yellow
A6191 Ratcliffe Gate	Green	Yellow
A6009 Rosemary St	Yellow	Yellow
A6009 St Peters Way	Yellow	Yellow
Yellow = flow difference of 10% to >30%; Green = flow difference of <10%		

Traffic Delays

4.28 A summary of journey time performance in terms of delays across the network in the 2031 Local Plan growth scenario is shown in Figures 2.7 & 2.8 of the Stage 2 report published in January 2015. Figures 2.9 & 2.10 show the differences in delay between the 2031 Reference Case and the 2031 Local Plan.

4.29 The results show delay differences of no more than -10 - +10 seconds from the 2031 References Case across most parts of the network. This is considered to have no overall or discernible traffic impact upon the highway network.

4.30 Other routes with larger traffic delay differences i.e. 30 – 60> seconds; 10 – 30 seconds are summarised in the Table 4.12:

Table 4.12 Local Plan - traffic delay differences between 2031 RC & 2031 LP

Route	Am peak	Pm peak	Am peak	Pm peak
A60 Leeming Ln North – north of Peafield Ln; between A6075 Peafield Ln & Warsop Rd	Red	Red	Green	Green
B6030 Sherwood Hall Rd – north of Ravensdale Rd	Red	Green	Green	Green
A6117 Oak Tree In – north of Southwell Rd	Red	Green	Green	Green
A6191 Chesterfield Rd North – north of Abbott Rd junction	Green	Red	Green	Green
A60 Leeming Lane – south of Peafield Lane	Green	Green	Yellow	Green
A60 Nottingham Road – approaching A611 Derby Road	Green	Green	Yellow	Green
A60 St Peters Way	Green	Green	Yellow	Green
B6020 Southwell Road east – at Rainworth	Green	Green	Yellow	Green
B6030 Carter Lane – approaching Rock Hill	Green	Green	Yellow	Green
Lichfield Lane	Green	Green	Yellow	Green
B6014 Skegby Lane – approaching A38 Sutton Road	Green	Green	Yellow	Green
A6191 Chesterfield Road North – North of Abbott Road junction	Green	Green	Yellow	Green
A6191 Chesterfield Road South – approaching Rosemary Street	Green	Green	Yellow	Green
A6191 Ratcliffe Gate – approaching St Peters Way	Green	Green	Yellow	Green
A6191 Southwell Road west – between Bellamy Road and Oak Leaf Close	Green	Green	Green	Yellow
A6191 Southwell Road west – between King George V Ave and Windsor Rd	Green	Green	Green	Yellow
A60 Nottingham Road – approaching A611 Derby Road	Green	Green	Green	Yellow
A60 Nottingham Road – between Forest Road and Berry Hill Lane	Green	Green	Green	Yellow
A60 Nottingham Road – between Quarry Lane and St Peters Way	Green	Green	Green	Yellow
A38 Sutton Road – between Skegby Lane and Botany Avenue	Green	Green	Green	Yellow
A6009 Chesterfield Road south – south of Rosemary Street	Green	Green	Green	Yellow
A6075 Abbott Road – between Water Lane and Chesterfield Road	Green	Green	Green	Yellow
Lichfield Lane	Green	Green	Green	Yellow
Bancroft Lane approaching A38	Green	Green	Green	Yellow
Ladybrook Lane between Bancroft Avenue and A6009	Green	Green	Green	Yellow
Red = delay difference 30-60> secs; Yellow = delay difference 10-30 secs				
Green = delay difference <30 secs				



5 Conclusions

5.1 The results of the 2031 Local Plan growth scenario have been analysed to assess the impact of the local plan development sites. This included assessing the number of junctions forecast to operate close to, or over capacity, and the impact of development on traffic flows along key routes within the district.

5.2 The results forecast that the Local Plan proposed development sites i.e. the 'urban sites' would marginally increase congestion compared to the 2031 Reference Case. The potential development sites would have the effect of increasing the number of junctions operating over capacity from 5 to 7.

5.3 The outputs from the modelling have been used to identify parts of the district's highway network which are forecast to experience increases in traffic flow, queuing and delay as a result of the local plan development sites. The results show the local plan growth would have no discernible impact upon the vast majority of the highway network compared with the 2031 Reference Case.

5.4 Slight delays are forecast to occur, but would be confined to localised sections of key routes of the highway network within the Mansfield urban area. Overall, based upon the findings of the Stage 2 report the impact on the highway network is not considered to be a 'showstopper' to the overall levels of local plan growth.

5.5 Based upon the results of the transport modelling the following junction and operational performances and mitigation measures were identified in the Study.

Table 5.1 Junction mitigation measures

Junction	Within capacity in.			Mitigation measures
	Base	RC	LP	
Chesterfield Rd / Debdale Ln	No	No	No	Likely to require additional land take, funding could be sourced from identified developments.
A60 Nottingham Rd / Berry Hill Ln	Yes	No	No	To improve overall efficiency MOVA control can be installed (£40k-100k). MOVA (Microprocessor Optimised Vehicle Actuation) is a traffic signal control system that uses a computer to optimise the signal timings using data from all the approaches to the junction. MOVA is able to vary the maximum cycle time in response to actual traffic flows, rather than the flows assumed for that time of day. It can also adjust the individual timings for one approach in response to conditions all round the junction. A GPS based system for additional improvements for public service vehicles (£4k-5k).
Carter Ln / Southwell Rd / Windsor Rd	Yes	Yes	No	Nearside crossing detection (low cost). An additional inbound lane, but with no obvious source (development site) for funding.
A60 Leeming Ln / New Mill Ln	Yes	No	No	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 Rd	Yes	Yes	Yes	No mitigation required. It is noted that funding has been secured for a Reference Case improvement.
A60 Leeming Ln / Peafield Ln	Yes	Yes	Yes	No mitigation required. Would most likely require land take for further improvements.
A38 Sutton Rd / Skegby Ln	Yes	Yes	No	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 St / Wood St	Yes	Yes	No	MOVA control in the Reference Case may improve efficiency (£40-100k). High cost options include further widening or the provision of a bypass.
A60 Leeming Ln / A6075 Warsop Rd	Not assessed	Not assessed	No	Nottinghamshire County Council plan for a traffic signal junction with provision for the wider A60 bus priority scheme.

5.6 In addition, two further options for mitigation to improve journey times predicted by the local plan growth were identified in the Study. One option is a bus priority measure which enables messages to be transmitted electronically from buses to allow traffic signal controllers to request a green light signal or extend the green light time further. 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.

5.7 A second option that can be installed, most beneficially as a corridor scheme, is a system of CCTV cameras. CCTV allows the urban traffic control centre to monitor 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 is possible to alter signal settings to adapt to changed flow patterns and intervene to speed up the clearing of queues.

5.8 The optimum locations for the installation of such CCTV systems within key transport corridors across the district are listed below:

- 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.

6 Next steps

6.1 As noted in previous sections, the strategic transport modelling has assessed the impact of committed developments as well as the local plan growth.

6.2 As well as the 2031 Reference Case development, the overall level of housing modelled under the Local Plan growth scenario comprises an extra 7,460 homes to 2031.

6.3 Since this strategic transport modelling was undertaken a new Strategic Housing Market Assessment has been undertaken to objectively assess the district's housing need (the 'OAN').

6.4 This assessment establishes the district's OAN as 7,520 new homes for the period 2013-2033. This scale of development broadly matches the overall level of housing growth considered within the current transport modelling.

6.5 In order to meet the OAN housing figure the consultation draft plan proposes development on a range of previously developed and greenfield sites within and adjacent to the urban areas of Mansfield, and Market Warsop.

6.6 As detailed above, the overall levels of development and the planned broad distribution of homes between the two urban areas in the consultation draft plan remains broadly the same as considered within the transport modelling.

6.7 There is however slight difference with locations of some of the specific development sites to be included within the consultation draft plan compared with those considered within the current transport modelling.

6.8 One of the main differences is that some inner urban housing sites previously considered are now identified as unavailable and are not being taken forward as housing allocations. As such, these sites are replaced with urban fringe sites at Mansfield, and Market Warsop in the consultation draft plan.

6.9 In the light of these changes to the location of development, the council will in advance of the next stage of the local plan process undertake a review and update of the Study as necessary in order to assess the traffic impact of the revised local plan developments sites and new plan period i.e. to 2033. Any such update will take into account the outcome of the consultation on the draft plan to inform the production of the next stage Publication Draft Plan due to be released in Summer 2016.