

Lichfield District Local Plan Submission

Transport Implications of the Proposed Main Modifications



August 2014

 **Staffordshire**
County Council

**LICHFIELD DISTRICT LOCAL PLAN
SUBMISSION**

**TRANSPORT IMPLICATIONS OF THE
PROPOSED MAIN MODIFICATIONS**

AUGUST 2014

JOB NUMBER:			DOCUMENT REF:			
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date
1	Draft Report	JJ	JJ	ND		12/08/2014
2	Second Draft Report	JJ	JJ	ND		21/08/2014
3	Final Report	JJ	JJ	ND	ND	28/08/2014
STAFFORDSHIRE COUNTY COUNCIL DEVELOPMENT SERVICES DIRECTORATE						

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1. INTRODUCTION

- 1.1 In 2009 Staffordshire County Council produced a report entitled 'Transport Appraisal of the Preferred Options for Lichfield City'. It considered the transport impact of the spatial strategy described in Lichfield District Council's Local Plan. An Addendum to this was prepared in 2012 following a number of changes to the scale and location of proposed residential, employment and retail development in Lichfield City.
- 1.2 Lichfield District Council submitted the Local Plan: Strategy to the Planning Inspectorate on the 22nd March 2013. Examination hearings took place during June and July 2013, with the Inspector reporting his initial findings in September 2013. The Inspector concluded that the Plan was unsound as it didn't make adequate provision for housing need. As part of the proposed main modifications to make the Local Plan sound, the inspector recommended the District Council find sites for an additional 900 houses.
- 1.3 Following this, the plan period has also been extended by a year to 2029. Lichfield District Council has therefore identified land for an additional 1,350 houses at Fradley (250); in the south of Lichfield at Deans Slade Farm (450) and Cricket Lane (450); and a further 200 units at various sites across the City. The site in Fradley replaces a previous employment allocation and Lichfield District Council has re-allocated this at Cricket Lane (12ha.).
- 1.4 This report is therefore required to consider whether vehicular traffic from these additional sites can be accommodated on the transport network in 2029. Given that the previous evidence was found sound, this report is considered a 'light refresh' with much of the methodology and detail contained in the earlier reports.

Report Structure

- 1.5 Chapter 2 provides an up to date review of the existing conditions on the local transport network.
- 1.6 Committed and proposed developments to be delivered by 2029 are identified in Chapter 3, with the methodology for estimating their likely trip generation and distribution detailed in Chapter 4.
- 1.7 Chapter 5 provides future year traffic flows (2029) and an assessment of their impact on the existing highway network. Previous reports described the Lichfield District Integrated Transport Strategy and it's potential to reduce vehicle trips. Chapter 6 provides an assessment of the local road network assuming the transport strategy is implemented.

- 1.8 Further mitigation will be required in the form of junction improvements, and these are discussed in Chapter 7. A Summary and Conclusions follow in Chapter 8.

2. EXISTING CONDITIONS

- 2.1 The 'Transport Appraisal of the Preferred Options for Lichfield City (2009)' and its 2012 Addendum both reviewed the existing conditions within the Lichfield City study area. This comprised baseline capacity assessments for the key network and 11 key junctions; and an analysis of the accident data in the study area over the previous five year period.
- 2.2 This report considers the implications of the proposed main modifications to the Local Plan and therefore updates these reviews, utilising some new survey data and the latest growth techniques and assumptions. Three new traffic counts were commissioned to ensure that all eleven key junctions have up to date counts, and SCC's traffic count database has been used to update link counts. The data has been brought to a common 2014 base year using National Transport Model growth factors, produced using TEMPRO. Appendix 2.1 contains the growth factor calculations, while Plans 2.1 and 2.2 show the 2014 AM and PM peak hour base year flows across the key network.
- 2.3 In addition, the accident analysis has been updated to the latest 5 year period.

Baseline Network and Junction Conditions (2014)

- 2.4 The key network and junctions are displayed in Plan 2.3 The 11 key junctions are:
- A51 Stafford Road / Eastern Avenue (Traffic Signals)
 - Pipehill (A461 Walsall Road / A5190 Lichfield Road (Roundabout)
 - A461 Walsall Road / Lichfield Southern Bypass (Roundabout)
 - Bowling Green (A461 Walsall Road / A51 Western Bypass / The Friary) (Roundabout)
 - Sainte Foy Avenue / A5127 Birmingham Road / The Friary (Roundabout)
 - Shortbutts Lane / A5127 Birmingham Road / Fosseway (Traffic Signals)
 - Greenhill (Rotten Row / A5127 Birmingham Road / Greenhill / Church Street) (Traffic Signals)
 - St. John Street / A5127 Birmingham Road / Upper St. John Street (Traffic Signals)
 - Upper St. John Street / A51 Tamworth Road / Shortbutts Lane / A5206 London Road (Traffic Signals)
 - A5127 Trent Valley Road / A5192 Eastern Avenue / Cappers Lane / Valley Lane (Roundabout)
 - A5192 Cappers Lane / Europa Way / Austin Cote Lane (Roundabout)
- 2.5 The following paragraphs discuss the existing conditions exhibited on the key network in 2014. Both links and junctions are considered within this

assessment, with junctions usually considered to be more critical to any congestion across the network.

- 2.6 It is accepted that the traffic flow dataset contains a limited number of observations however for this high level analysis they are considered sufficient. Based on professional judgement and local knowledge, they appear to represent 'typical conditions' on the highway network in Lichfield. Exceptional traffic flow conditions would undoubtedly have led to the identification of other localised congestion problems.

Link Capacities

- 2.7 Each link within the key network has been tested against its theoretical link capacity, using TA 79/99: Traffic Capacity of Urban Roads (May 1999) from Volume 5, Section 1, Part 3 of the Design Manual for Roads and Bridges.
- 2.8 These link capacities have then been compared to the 2014 Base flows (AM and PM peak hours) and a Ratio of Flow to Capacity (RFC) has been calculated for each link. An RFC of 0.85 is usually considered to show a link or junction is operating at, or close to, capacity. Above this threshold traffic congestion forms and journey reliability cannot be ensured. It is therefore considered a reliable measure of 'network stress'.
- 2.9 Tables 2.1 and 2.2 show the results of this assessment with plans 2.4 and 2.5 displaying the results graphically.
- 2.10 The results demonstrate that there are currently no acute link congestion issues with all links in the key network currently operating with RFCs of less than 0.85, except for St. John Street, north of the signalised junction with Birmingham Road and the A461 south of Lichfield Southern Bypass (PM peak only).

Table 2.1. Link Capacities on the Key Network - 2014 Base Flows (AM Peak)

Road Name / Location	Road Width	Road Type	Total 2-Way Flow	2014 AM Base Traffic Flows (2-way)	2014 Ratio of Flow to Capacity (RFC)
A5190 Lichfield Rd, Pipehill	7m	UAP1	2405	1493	0.62
A461 Walsall Rd, South of Lichfield Southern Bypass	7m	UAP1	2405	1891	0.79
A461 Walsall Rd, West of Bow ling Green roundabout	8m	UAP2	2505	1298	0.52
Sainte Foy Avenue, West of A5127 Roundabout	7.3m	UAP1	3350	843	0.25
Eastern Avenue, North of Trent Valley Roundabout	7.3m	UAP1	3350	1473	0.44
A5127 Trent Valley Road, West of Trent Valley Roundabout	6.4m	UAP3	1823	1103	0.60
A5127 Birmingham Road, South of Shortbutts Lane	6.9m	UAP3	1937	987	0.51
A5127 Birmingham Road, North of Shortbutts Lane	7m	UAP3	1993	1302	0.65
A51 The Friary, North of Chesterfield Road roundabout	9.4m	UAP2	2650	1492	0.56
A51 Western Bypass, North of Bow ling Green roundabout	10m	UAP1	3350	1965	0.59
A51 Western Bypass, North of Eastern Avenue traffic signals	10m	UAP1	3350	2184	0.65
A51 Western Bypass, South of Eastern Avenue traffic signals	10m	UAP1	3350	1813	0.54
A5192 Eastern Avenue, East of traffic signals	7.9m	UAP1	2808	1329	0.47
A5192 Eastern Avenue, East of Grange Lane	7.5m	UAP1	2703	1326	0.49
A5127 Trent Valley Road, East of Eastern Avenue roundabout	9.15m	UAP1	3138	1483	0.47
A5192 Cappers Lane, South of Trent Valley Road roundabout	7m	UAP2	2258	1588	0.70
A5192 Cappers Lane, East of Austin Cote Lane roundabout	7.3m	UAP1	2650	950	0.36
Austin Cote Lane, South of Cappers Lane roundabout	6.4m	UAP3	1662	1033	0.62
Ryknild Street, South of Roman Way roundabout	6.6m	UAP3	1770	600	0.34
A51 Tamworth Road, West of Ryknild Street traffic signals	7.3m	UAP3	2167	646	0.30
A5206 London Road, South of A51 Tamworth Road traffic signals	9.3m	UAP1	3175	1023	0.32
Shortbutts Lane, West of London Road traffic signals	6.1m	UAP3	1500	632	0.42
Shortbutts Lane, West of Lichfield Southern Bypass Phase 3 leg	6.1m	UAP3	1500	692	0.46
A51 Upper St. Johns Street, South of Birmingham Road traffic signals	7.4m	UAP3	2190	1180	0.54
Rotten Row , South of Greenhill traffic signals	6.1m	UAP4	1250	751	0.60
A5127 Trent Valley Road, East of Greenhill traffic signals	6.6m	UAP3	1770	1282	0.72
A5127 Birmingham Road, West of Greenhill traffic signals	6.7m	UAP3	1823	1276	0.70
A51 St. John Street, North of Birmingham Road traffic signals	6.1m	UAP4	1250	1093	0.87
A51 The Friary, East of Bow ling Green roundabout	9.5m	UAP2	2667	1228	0.46
A5127 Birmingham Road, West of St. John Street traffic signals	7.3m	UAP3	2167	1273	0.59

Table 2.2. Link Capacities on the Key Network - 2014 Base Flows (PM Peak)

Road Name / Location	Road Width	Road Type	Total 2-Way Flow	2014 PM Base Traffic Flows (2-way)	2014 Ratio of Flow to Capacity (RFC)
A5190 Lichfield Rd, Pipehill	7m	UAP1	2405	1570	0.65
A461 Walsall Rd, South of Lichfield Southern Bypass	7m	UAP1	2405	2061	0.86
A461 Walsall Rd, West of Bow ling Green roundabout	8m	UAP2	2505	1143	0.46
Sainte Foy Avenue, West of A5127 Roundabout	7.3m	UAP1	3350	1016	0.30
Eastern Avenue, North of Trent Valley Roundabout	7.3m	UAP1	3350	1556	0.46
A5127 Trent Valley Road, West of Trent Valley Roundabout	6.4m	UAP3	1823	1050	0.58
A5127 Birmingham Road, South of Shortbutts Lane	6.9m	UAP3	1937	917	0.47
A5127 Birmingham Road, North of Shortbutts Lane	7m	UAP3	1993	1094	0.55
A51 The Friary, North of Chesterfield Road roundabout	9.4m	UAP2	2650	1421	0.54
A51 Western Bypass, North of Bow ling Green roundabout	10m	UAP1	3350	1891	0.56
A51 Western Bypass, North of Eastern Avenue traffic signals	10m	UAP1	3350	1974	0.59
A51 Western Bypass, South of Eastern Avenue traffic signals	10m	UAP1	3350	1681	0.50
A5192 Eastern Avenue, East of traffic signals	7.9m	UAP1	2808	1075	0.38
A5192 Eastern Avenue, East of Grange Lane	7.5m	UAP1	2703	1340	0.50
A5127 Trent Valley Road, East of Eastern Avenue roundabout	9.15m	UAP1	3138	1426	0.45
A5192 Cappers Lane, South of Trent Valley Road roundabout	7m	UAP2	2258	1470	0.65
A5192 Cappers Lane, East of Austin Cote Lane roundabout	7.3m	UAP1	2650	924	0.35
Austin Cote Lane, South of Cappers Lane roundabout	6.4m	UAP3	1662	1059	0.64
Ryknild Street, South of Roman Way roundabout	6.6m	UAP3	1770	383	0.22
A51 Tamworth Road, West of Ryknild Street traffic signals	7.3m	UAP3	2167	687	0.32
A5206 London Road, South of A51 Tamworth Road traffic signals	9.3m	UAP1	3175	1190	0.37
Shortbutts Lane, West of London Road traffic signals	6.1m	UAP3	1500	618	0.41
Shortbutts Lane, West of Lichfield Southern Bypass Phase 3 leg	6.1m	UAP3	1500	653	0.44
A51 Upper St. Johns Street, South of Birmingham Road traffic signals	7.4m	UAP3	2190	1364	0.62
Rotten Row , South of Greenhill traffic signals	6.1m	UAP4	1250	751	0.60
A5127 Trent Valley Road, East of Greenhill traffic signals	6.6m	UAP3	1770	1296	0.73
A5127 Birmingham Road, West of Greenhill traffic signals	6.7m	UAP3	1823	1351	0.74
A51 St. John Street, North of Birmingham Road traffic signals	6.1m	UAP4	1250	1223	0.98
A51 The Friary, East of Bow ling Green roundabout	9.5m	UAP2	2667	1074	0.40
A5127 Birmingham Road, West of St. John Street traffic signals	7.3m	UAP3	2167	1329	0.61

Junction Capacities

- 2.11 The original key junction capacity assessments have been updated using the new 2014 base flows and the latest industry standard capacity assessment software tools Junctions8 and LinSig.
- 2.12 The 2014 base year models have been calibrated using journey time and delay data from the Trafficmaster dataset, and supplemented by observations obtained during site visits. This has ensured that the base year capacity assessments reasonably reflect the levels of congestion currently observed at these junctions.
- 2.13 The capacity results are displayed in Table 2.3 and a description is contained below. A Ratio of Flow to Capacity (RFC) of 0.85 for roundabouts and a Degree of Saturation (DoS) of 0.9 for signalised junctions is usually

considered to show a link or junction is operating at, or close to, capacity. Above this threshold traffic congestion can form and journey reliability cannot be ensured. That said, in urban situations higher DoS/RFCs may be acceptable where queue lengths and vehicular delays remain small – particularly at the end of the plan period or at the end of a scheme’s design life.

2.14 Many of the eleven key junctions currently operate within design capacity. These include:

- Cappers Lane / Europa Way / Austin Cote Lane (Roundabout)
- A51 / Eastern Avenue (Traffic Signals)
- Shortbutts Lane / A5127 / Fosseyway (Traffic Signals)
- A461 Walsall Road / Lichfield Southern Bypass (Roundabout)
 - The RFC is just over the 0.85 threshold in the AM peak (0.87) on the A461 W arm, however, queues (6 vehicles) and delays (17 seconds) are small.
- Pipehill (A461 Walsall Road / A5190 Lichfield Road) (Roundabout)
 - The RFC is 0.87 in the AM peak on the A5190 arm, however, queues (6 vehicles) and delays (23 seconds) are acceptable.
- Greenhill (Rotten Row / A5127) (Traffic Signals)
 - The models for this junction calibrated better to observed delays assuming the pedestrian facility was demanded every other cycle. Site observations were conducted which helped support this assumption, particularly so in the PM peak. N.B. An assessment assuming pedestrians are called every cycle in the AM peak demonstrates that the junction operates within capacity but the calibration to observed delays is not as good.

2.15 Whilst there are no acute problems on any of the remaining five key junctions, it is recognised that they are currently operating at or just over capacity. Junctions operating at or above capacity may be particularly sensitive to additional traffic in future years. These junctions are:

- Sainte Foy Avenue / A5127 / The Friary (Roundabout)
 - The Sainte Foy Avenue arm is currently at capacity in the AM peak, with significant queues and vehicle delays of 3 minutes.
- A5127 / Eastern Avenue / Cappers Lane / Valley Lane (Roundabout)
 - This junction currently operates at capacity with most approaches suffering from the effects of congestion. Overall the PM peak is more acute than the AM peak. The A5192 Cappers Lane approach has the largest queues and delays.

- Bowling Green (A461 / A51 / The Friary) (Roundabout)
 - This junction is at capacity in both peaks, with the A461 arm struggling in the AM peak, and the A51 N arm at capacity in both peaks.
- Upper St. John Street / A51 Tamworth Road / A5206 London Road / Shortbutts Lane (Traffic Signals)
 - Junction capacity assessments show that in 2014 this junction operates at capacity in both peaks. The AM is worse with Shortbutts Lane suffering high delays. The LinSig model predicts slightly higher delays than observed, making for a robust assessment.
- St. John Street / A5127 / Upper St. John Street (Traffic Signals)
 - LinSig shows that this junction is operating with degrees of saturation of just less than 90% in the AM peak and just over 90% in the PM peak hour. The model calibrates reasonably well to observed delays, slightly overestimating Upper St. John in the PM peak.

Table 2.3 Summary of Capacity Results for Key Junctions in Lichfield – 2014 Base Year

Junction	Arm	2014 Base					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
A461 / Lichfield Southern Bypass	A461 Walsall Road East	0	4	0.32	1	4	0.43
	Lichfield Southern Bypass	1	5	0.41	4	19	0.81
	A461 Walsall Road West	6	17	0.87	2	5	0.60
Pipehill (A461 / A5190)	A461 North	1	4	0.44	3	8	0.76
	A461 South	1	5	0.44	2	11	0.64
	A5190	6	23	0.87	1	5	0.45
Bowling Green (A461 / A51 / The Friary)	A51 Western Bypass	40	125	1.05	17	67	0.98
	The Friary East	0	2	0.18	2	10	0.64
	Friary Avenue	0	5	0.06	0	5	0.09
	The Friary South	1	5	0.57	6	35	0.88
	Walsall Road	22	84	1.00	4	23	0.80
Sainte Foy Avenue / A5127 / The Friary	The Friary	2	8	0.64	1	5	0.51
	Birmingham Road East	1	5	0.50	2	7	0.67
	Birmingham Road South	2	12	0.70	3	19	0.76
	Sainte Foy Avenue	26	185	1.08	1	17	0.58
A5127 / Eastern Avenue / Cappers Lane / Valley Lane	A5192 Eastern Avenue	8	36	0.91	7	34	0.89
	A5127 Burton Road	8	37	0.91	8	38	0.91
	A5192 Cappers Lane	13	60	0.96	21	91	1.01
	A5127 Trent Valley Road	2	15	0.69	9	58	0.94
	Valley Lane	0	11	0.31	0	11	0.23
Cappers Lane / Europa Way / Austin Cote Lane	Cappers Lane West	2	7	0.65	1	5	0.54
	Europa Way	0	5	0.18	1	7	0.42
	Cappers Lane East	1	5	0.46	1	6	0.45
	Austin Cote Lane	2	8	0.60	1	5	0.39

Junction	Arm		2014 Base					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
A51 / Eastern Avenue	A51 North	L	8	10	44.6	2	3	19.0
		S	14	61	80.2	7	34	39.2
		SR	15	60	81.2	8	34	41.0
	Eastern Avenue	L	2	10	14.9	4	17	23.2
		SR	9	40	51.9	13	44	67.8
	A51 South	LS	12	18	51.5	19	23	68.7
		R	10	48	65.5	6	61	58.2
	Hedgehog Access	LSR	-	-	-	-	-	-
	Degree of Saturation		81.2%			68.7%		
Practical Reserve Capacity		10.9%			31.1%			
Upper St. John Street / A51 Tamworth Road / A5206 London Road / Shortbutts Lane	Upper St. John St	LSR	23	55	87.7	18	40	74.3
	Tamworth Road	L	4	58	41.4	6	49	47.8
		SR	8	74	72.9	6	49	45.7
	London Road	LS	15	31	62.2	30	44	90.1
		R	1	52	11.5	0	39	6.1
	Shortbutts Lane	LSR	23	134	99.1	7	81	75.9
	Degree of Saturation		99.1%			90.1%		
Practical Reserve Capacity		-10.1%			-0.2%			
Greenhill (Rotten Row / A5127)	A5127 Church Street	LS	15	27	68.3	16	29	76.1
		R						
	Rotten Row	LS	8	40	66.8	5	34	55.9
		R						
	A5127 Birmingham Road	LS	20	31	79.4	12	24	63.1
		R						
	Greenhill	LS	3	32	25.7	4	31	36.0
		R						
Degree of Saturation		79.4%			76.1%			
Practical Reserve Capacity		13.4%			18.2%			
Shortbutts Lane / A5127 / Fosseway	A5127 North	LSR	8	14	62.6	7	15	59.3
	Shortbutts Lane	LSR	6	37	72.9	11	53	89.9
	A5127 South	LSR	11	21	78.6	7	16	59.0
	Fosseway	LSR	1	23	21.5	0	21	58.0
	Degree of Saturation		78.6%			89.9%		
	Practical Reserve Capacity		14.6%			0.1%		
St. John Street / A5127 / Upper St. John Street	St. John Street	LS	21	47	89.4	21	53	90.7
		R						
	Birmingham Road East	L	10	27	63.8	22	42	89.4
		S						
		R						
	Upper St. John Street	L	9	26	58.7	23	57	93.6
		S						
		R						
	Birmingham Road West	LS	20	43	87.3	8	37	69.7 / 91.1
R								
Degree of Saturation		89.4%			93.6%			
Practical Reserve Capacity		0.7%			-4.0%			

Safety

- 2.16 Accident data was examined over the entire key network for the latest available 5 year period (1st January 2009 – 31st December 2013). Plan 2.6 shows a geographical plot of these data.
- 2.17 In order to provide a comprehensive analysis of accidents within Lichfield, and to help identify any potential hotspots that could be worsened by the introduction of new development, the following approach has been taken:-
- A global summary of all accidents across the key network
 - Analysis of accidents at the identified key junctions within Lichfield
 - Identification of any other clusters and trends from the global data

Global Statistics

- 2.18 Table 2.4 displays a brief summary of the total accident statistics for the whole of the key network.

Table 2.4. Global Summary of Accident Data for Lichfield (1st January 2009 – 31st December 2013)

Severity	Number of Accidents	Number of Pedestrians	Number of Cyclists
Fatal	3	2	0
Serious	4	3	0
Slight	280	N/A	N/A
Total	287		

- 2.19 In total there have been 287 accidents across the whole of the key network. Of these 280 were slight injury accidents, 4 were serious and 3 were fatal. Two of the fatal accidents involved a pedestrian, one related to alcohol drugs and physical or mental illness, and another involved an emergency vehicle on call. Over half of the serious accidents included pedestrians. Plan 2.6 displays the location of these accidents.
- 2.20 There are no apparent underlying problems or causes of the serious and fatal accidents. Most were due to human error or misjudgement (e.g. speed or failing to look properly).

Key Junctions

- 2.21 The previously identified key junctions within the network have been isolated and the accident data assessed. These key junctions include previously known congestion hotspots, critical access points to the city and to retail and commercial areas, and junctions in the vicinity of potential new developments. As such they are likely to be more heavily trafficked and could potentially cause more conflicts.

2.22 A summary of the accidents at these junctions is documented in Table 2.5, with more detailed discussion in the following paragraphs.

Table 2.5. Summary of Accident Data at Key Junctions in Lichfield

Key Junction	Fatal	Serious	Slight	Peds	Cyclists
A51 / Eastern Avenue			10	1	
A461 / Lichfield Southern Bypass			2		
Bowling Green Roundabout			13	1	1
Sainte Foy Ave / A5127 / The Friary			6		
Shortbutts Lane / A5127 / Fosseyway			0		
A51 / St.John St / A5127 / Upper St.John St			10		
Upper St.John St / A51 / Shortbutts Lane			2		
Greenhill Signals			2		
A5127 / Eastern Avenue / Cappers Lane			4		2
Cappers Ln / Burton Old Rd / Austin Cote Ln			2		1
Pipehill Roundabout (opened in August 2010)			1		

2.23 A roundabout was constructed at Pipehill to improve traffic flow through this part of the network. It was completed in August 2010 and since then there has been one slight accident.

2.24 The majority of the remaining key junctions have a relatively small number of slight injuries with no linked causation. The only key junctions that warrant any further consideration are the A51 / Eastern Avenue traffic signals, the Bowling Green roundabout, the Sainte Foy Avenue / A5127 / The Friary roundabout and the A51 / St John Street / A5127 / Upper St Johns Street traffic signals. These are discussed below.

A51 / Eastern Avenue (Traffic Signals)

2.25 There have been 10 slight injury accidents in 5 years at this location, one involving a pedestrian. This is a heavily trafficked junction and so involves a high degree of vehicular conflict. SCC's Casualty Investigation Unit has looked at the accidents at this location and came to the conclusion that there were no significant common causalities that remedial measures could address.

Bowling Green (A461 / A51 / The Friary) (Roundabout)

2.26 There have been 13 slight injury accidents at the Bowling Green roundabout during the last 5 years. One involved a cyclist and one a pedestrian.

2.27 Four of the accidents occurred on the A51 Western Bypass arm. There were a variety of vehicle movements and causes for these accidents and there is not one significant, identifiable element for remedial attention. In the October 2009 'Transport Appraisal of the Preferred Options for Lichfield City' a problem was identified for vehicles turning left off the roundabout and colliding with vehicles on the A51 Western Bypass approach. This problem appears to have receded, even though the proposed realignment of the kerb, as recommended in the October 2009 Transport Appraisal of the Preferred Options for Lichfield City, has not yet been carried out. This situation should

be monitored going forward and if a re-occurrence is evident, remedial works undertaken.

Sainte Foy Avenue / A5127 / The Friary (Roundabout)

- 2.28 There have been 6 slight accidents at this location. No pattern has emerged among the causalities of the accidents. This roundabout has a high number of vehicle conflicts associated with the large traffic flows using the junction.

A51 / St John Street / A5127 / Upper St Johns Street (Traffic Signals)

- 2.29 In the past five years there have been 10 injury accidents at this location, all slight in severity. None involved pedestrians or pedal cyclists. There were no common causalities and most involved driver errors or failing to comply with the traffic signals.

Other Clusters and Trends

- 2.30 In addition to assessing the key junctions it was also necessary to examine the whole study area to determine if there were any other clusters and trends which may be exacerbated by increased traffic levels in 2029, and hence may need attention.
- 2.31 Two locations were identified during this examination, while accident rates have fallen at a further two locations identified in previous versions of this report.

A51 Upper St. Johns Street. near Chapel Lane junction.

- 2.32 There have been 6 slight injury accidents in this locality in the past 5 years. Two of these involved pedestrians with 2 child casualties, 16 and 17 years old, respectively. King Edward V1 High School is located nearby, with its entrance directly onto Upper St. Johns Street. A zebra crossing is located on the A51 outside the school. The accident situation at this location will continue to be monitored.

A51 Eastern Avenue / Grange Lane Priority Junction

- 2.33 Over the last 5 years there have been 6 slight injury accidents at this location. This location is a busy junction, with a lot of vehicle and pedestrian conflicts. There is no single factor that stands out amongst the accident records and a variety of vehicle movements were involved. The junction has a modern design and good visibility and so it is difficult to improve the layout. However, accidents at this location will continue to be monitored by the County Council.

Dimbles Lane / Weston Road Junction

- 2.34 In the October 2009 'Transport Appraisal of the Preferred Options for Lichfield City' an accident cluster was identified at the Dimbles Lane/Weston Road priority junction. There has been a fall in accidents to two slight accidents in

the past five years at this location. However, accidents at this location will continue to be monitored.

Netherstowe / Purcell Avenue area

- 2.35 In the November 2012 'Transport Appraisal of the Preferred Options for Lichfield City Addendum' an accident cluster was identified in the Netherstowe / Purcell Avenue area. The accident rate has since receded, with only one slight accident in the past five years. However, accidents in this area will continue to be monitored.

Air Quality Management Area (AQMA)

- 2.36 An AQMA came into effect at Muckley Corner junction on the A5 in August 2008. The Muckley Corner junction is located to the south-west of Lichfield and is part of the trunk road network, which is controlled by the Highways Agency (HA). Since then Lichfield District Council have been working closely with the HA, Staffordshire County Council and Midland Expressway Ltd to develop an action plan. A remedial measure was implemented at the junction in 2011 and the impacts of this continued to be monitored.
- 2.37 It has now been concluded that the 2011 works did not have a positive improvement on air quality. Current monitoring shows the original nitrogen dioxide exceedence still persists.
- 2.38 Staffordshire County Council and Lichfield District Council continue to work through the A5 Transport Liaison Group to develop a management strategy for the A5, including the Muckley Corner Junction, and with other Staffordshire authorities with the aim of launching a Countywide 'Ecostars' scheme. Potential funding streams are currently being investigated.
- 2.39 A dedicated air quality action plan is due to be drafted during summer 2014 for the Muckley Corner AQMA with a view to being published in autumn 2014.
- 2.40 Lichfield District Council's 2014 Air Quality Progress Report (still in draft) concludes that a second AQMA should be declared in the district. The location is 4 properties along the A38 north-bound near Fradley. Subject to the Progress Report being published and it's recommendations accepted by Defra then the authority will begin actions to declare the new AQMA.

3. IDENTIFICATION OF NEW DEVELOPMENT TO 2029

- 3.1 Previous evidence from Staffordshire County Council considered the revised spatial strategy for the district identified in the Lichfield District Local Plan document entitled 'Our Strategy' (July 2012).
- 3.2 Following examination of the Local Plan in June and July 2013 the Inspector recommended that in order to make the plan sound Lichfield District Council needed to find sites to accommodate a further 900 houses. To address this, and the subsequent extension of the plan period by one year to 2029, the district council has identified land for an additional 1,350 houses at Fradley (250); in the south of Lichfield at Deans Slade Farm (450) and Cricket Lane (450); and a further 200 units at various sites across the City. The site in Fradley replaces a previous employment allocation and Lichfield District Council has re-allocated this at Cricket Lane (12ha.).
- 3.3 This report has been prepared to assess whether vehicular traffic from the additional sites can be accommodated on the transport network. It will provide an updated evidence base in response to the proposed Main Modifications to Lichfield's Local Plan, describing what transport schemes and mitigation measures will be required to help deliver the additional growth.
- 3.4 Tables 3.1, 3.2 and 3.3 document all the developments considered by this report. This has involved a number of assumptions which were made in consultation with Lichfield District Council. They will be subject to further consideration through the Allocations document which will be published subsequent to the adoption of the strategy. Only those housing sites of 10 dwellings or more have been assessed in detail (i.e. at their specific location). It has been assumed that sites with fewer dwellings are contained within the overall levels of background traffic growth factored into this assessment.

Table 3.1. Potential Housing Sites in Lichfield City to 2029

Planning Status	Location	No. of Dwellings
Local Plan - Streethay Direction	North of Streethay SDA	750
Local Plan - South Lichfield Direction	South of Lichfield SDA	450
Local Plan - Cricket Lane	Cricket Lane SDA	450
Local Plan- Deans Slade	Deans Slade SDA	450
PP (Full)	Friarsgate	48
PP (Full)	Friary Outer	60
PP (Outline)	Trent Valley Buffer Depot	75
Under Construction	Land fronting Church Street (former PH), Lichfield Tesco Store	22
PP Full	Malthouse, Birmingham Road	41

Table 3.2. Potential Employment Sites in Lichfield City to 2029

Location	Net GFA (sqm)	Comments
Lichfield City Centre	9670	Office
Trent Valley Area	5000	Office
Wall Island	10000	Office
Stofords - Streethay	3158	B1(a) (Stofords)
	37807	B1(c), B2, B8
City Wharf (Blocks C and D)	1330	Office
Former Revelan Works, Eastern Avenue	1017	B1
	4930	B2
	5634	B8
Land North of Britannia Park	764	B1
	3701	B2
	4230	B8
Cricket Lane	10500	B1 (c) / B2
	36000	B8

Table 3.3. Potential Retail Sites Lichfield City to 2029

Location	Net GFA (sqm)	Comments
Additional City Centre	1500	convenience
	7500	comparison
Additional Bulky Goods	5000	comparison
Friarsgate	1500	convenience
	20500	comparison

4. TRIP GENERATION AND ASSIGNMENT

Trip Generation

- 4.1 Trip generation was detailed in the previous evidence. The only element of this that has been updated in this latest report is residential trips rates.
- 4.2 Two residential trip rate surveys were completed in February / March 2014; both located at self-contained modern developments in the south of Lichfield (Pasco Drive and Agincourt Road). These provide a realistic trip rate to assess the traffic impacts of Lichfield Local Plan housing sites, and in particular should be very representative of the proposed sites in south Lichfield.
- 4.3 Table 4.1 compares the new and old residential trip rates. It can be seen that the latest trip rates are around 10 to 15% lower than the original rates, which were generic trip rates taken from the TRICS database. Lichfield is a compact City and also offers good close access to two railway stations. Footfall at the stations has increased from 0.84m to 1.55m between 2006/07 and 2012/13. A lower trip rate is not therefore unexpected.

Table 4.1. Comparison of Residential Trip Rates

	AM Peak			PM Peak		
	Trip Rates (per Residential Unit)			Trip Rates (per Residential Unit)		
	In	Out	Total	In	Out	Total
Original Trip Rates	0.133	0.444	0.577	0.42	0.213	0.633
2014 Trip Rates	0.097	0.401	0.498	0.401	0.181	0.582

- 4.4 Appendix 4.1 contains a more detailed description of how these trip rates were adapted and used for the purpose of this study. Appendix 4.2 contains TRICS outputs used to obtain the Retail Park trip rates, while Appendix 4.3 displays the number of trips associated with each development with the trip rates applied.

Trip Distribution

- 4.5 The Trip Distribution methodology was detailed in the previous reports. However, two changes have been made to the methodology for this assessment.
- 4.6 Firstly, the County Council as Highway Authority no longer supports the northbound closure of St. John Street to all motor vehicles, except buses. This scheme had been linked to the Friarsgate development proposals, although plans for this development are likely to be re-submitted. In any case, it is recommended that this scheme is removed from any plans for

the Friarsgate development. Further and more detailed assessment work completed at the planning application stage for the St. John's development in south Lichfield determined that this scheme has detrimental effects on the capacity of the surrounding highway network. Therefore traffic flows are no longer re-assigned in the assessment work to simulate the effects of this closure.

- 4.7 Secondly, the (old) Lichfield SATURN model was updated last year to help inform the Local Plan Main Modifications process, and specifically to help re-assess the benefits and implications of completion of the final stage of the Lichfield Southern Bypass in the context of increased residential and employment development.
- 4.8 This updated model was used to recalculate the re-assignment effects of the completion of Lichfield Southern Bypass. The results were applied to the background traffic and the manually assigned proposed retail trips in the 2029 flow scenarios. The new housing and employment trips already assume completion of the bypass and did not require re-assignment.
- 4.9 Appendix 4.4 contains a more detailed description of how these trip distributions were adapted and used for the purpose of this study.
- 4.10 A new SATURN model will be commissioned in 2014/15 by the County Council to assist with the preparation of a Major Scheme Business Case for the Lichfield Southern Bypass. Output from this new model will be available to inform development control decisions and junction improvement schemes within the plan period to 2029 and beyond. The new 2011 census origin-destination data, the first release of which became available at the end of July 2014, will be used to inform the model building process.

5. TRAFFIC IMPACT - 2029 DO-MINIMUM SCENARIO

- 5.1 Baseline conditions were established in Chapter 2. This chapter considers a 2029 Do-Minimum (DM) scenario which includes all proposed Local Plan development; growth in existing traffic flows; and assumes the completion of Lichfield Southern Bypass. As detailed earlier (para 4.6), this review no longer considers the closure of St. John Street (northbound) to all vehicles except buses.
- 5.2 A set of 2029 Do-Something (DS) scenarios are assessed in Chapter 6, reflecting the potential impact of implementing the interventions included in the Lichfield District Integrated Transport Strategy. The results in this chapter should therefore be treated as a worst case scenario which set the traffic scene should a complementary sustainable transport strategy not be implemented as part of delivering growth in Lichfield City.

2029 Do-Minimum Scenarios

- 5.3 The 2029 DM Scenario traffic flows (see Plans 5.1 and 5.2) were estimated by factoring the 2014 Base Year by National Traffic Model growth forecasts (produced using TEMPRO, and excluding new housing and job assumptions), and then adding new development traffic explicitly. Appendix 2.1 contains growth factor assumptions.
- 5.4 As discussed earlier, these latest flows predictions will differ from the previous transport appraisals for several reasons. These include a different forecast year; updated bypass assumptions; no future closure of St. John Street; revised Local Plan developments; and revised housing trip rates.

Link Capacities

- 5.5 The theoretical link capacities on the key network were compared to the 2029 DM traffic flows, and the results are displayed in Tables 5.1 and 5.2 and Plans 5.3 and 5.4. An RFC of 0.85 is usually considered to show a link or junction is operating at, or close to, capacity.
- 5.6 There were no link capacity issues in 2014, aside from St John Street, north of the traffic signals and the A461 south of phase one of Lichfield Southern Bypass. The 2029 DM scenario however highlights that, with the addition of background growth and new development trips and even with the bypass completed, several links will be carrying more traffic than they can theoretically accommodate.

5.7 It can be seen that with no transport strategy in place, nine links surpass the 0.85 benchmark in both peaks, with four of these predicted to be operating at over 100% (i.e. over 1.00) of theoretical capacity.

Table 5.1. Link Capacities on the Key Network – 2029 Do-Minimum Flows (AM Peak)

Road Name / Location	Road Width	Road Type	Total 2-Way Flow	2029 Do-Something Traffic Flows (2-way)	2029 Ratio of Flow to Capacity (RFC)
A5190 Lichfield Rd, Pipehill	7m	UAP1	2405	1990	0.83
A461 Walsall Rd, South of Lichfield Southern Bypass	7m	UAP1	2405	2465	1.03
A461 Walsall Rd, West of Bowling Green roundabout	8m	UAP2	2505	1445	0.58
Sainte Foy Avenue, West of A5127 Roundabout	7.3m	UAP1	3350	1034	0.31
Eastern Avenue, North of Trent Valley Roundabout	7.3m	UAP1	3350	1925	0.57
A5127 Trent Valley Road, West of Trent Valley Roundabout	6.4m	UAP3	1823	1614	0.89
A5127 Birmingham Road, South of Shortbutts Lane	6.9m	UAP3	1937	1528	0.79
A5127 Birmingham Road, North of Shortbutts Lane	7m	UAP3	1993	1728	0.87
A51 The Friary, North of Chesterfield Road roundabout	9.4m	UAP2	2650	1819	0.69
A51 Western Bypass, North of Bowling Green roundabout	10m	UAP1	3350	2396	0.72
A51 Western Bypass, North of Eastern Avenue traffic signals	10m	UAP1	3350	2621	0.78
A51 Western Bypass, South of Eastern Avenue traffic signals	10m	UAP1	3350	2203	0.66
A5192 Eastern Avenue, East of traffic signals	7.9m	UAP1	2808	1599	0.57
A5192 Eastern Avenue, East of Grange Lane	7.5m	UAP1	2703	1570	0.58
A5127 Trent Valley Road, East of Eastern Avenue roundabout	9.15m	UAP1	3138	2403	0.77
A5192 Cappers Lane, South of Trent Valley Road roundabout	7m	UAP2	2258	2300	1.02
A5192 Cappers Lane, East of Austin Cote Lane roundabout	7.3m	UAP1	2650	1401	0.53
Austin Cote Lane, South of Cappers Lane roundabout	6.4m	UAP3	1662	1426	0.86
Ryknild Street, South of Roman Way roundabout	6.6m	UAP3	1770	881	0.50
A51 Tamworth Road, West of Ryknild Street traffic signals	7.3m	UAP3	2167	1126	0.52
A5206 London Road, South of A51 Tamworth Road traffic signals	9.3m	UAP1	3175	1374	0.43
Shortbutts Lane, West of London Road traffic signals	6.1m	UAP3	1500	228	0.15
Shortbutts Lane, West of Lichfield Southern Bypass Phase 3 leg	6.1m	UAP3	1500	324	0.22
A51 Upper St. Johns Street, South of Birmingham Road traffic signals	7.4m	UAP3	2190	1395	0.64
Rotten Row, South of Greenhill traffic signals	6.1m	UAP4	1250	762	0.61
A5127 Trent Valley Road, East of Greenhill traffic signals	6.6m	UAP3	1770	1813	1.02
A5127 Birmingham Road, West of Greenhill traffic signals	6.7m	UAP3	1823	1859	1.02
A51 St. John Street, North of Birmingham Road traffic signals	6.1m	UAP4	1250	1252	1.00
A51 The Friary, East of Bowling Green roundabout	9.5m	UAP2	2667	1366	0.51
A5127 Birmingham Road, West of St. John Street traffic signals	7.3m	UAP3	2167	2038	0.94

Table 5.2. Link Capacities on the Key Network – 2029 Do-Minimum Flows (PM Peak)

Road Name / Location	Road Width	Road Type	Total 2-Way Flow	2029 Do-Something Traffic Flows (2-way)	2029 Ratio of Flow to Capacity (RFC)
A5190 Lichfield Rd, Pipehill	7m	UAP1	2405	2087	0.87
A461 Walsall Rd, South of Lichfield Southern Bypass	7m	UAP1	2405	2681	1.11
A461 Walsall Rd, West of Bow ling Green roundabout	8m	UAP2	2505	1299	0.52
Sainte Foy Avenue, West of A5127 Roundabout	7.3m	UAP1	3350	1255	0.37
Eastern Avenue, North of Trent Valley Roundabout	7.3m	UAP1	3350	2076	0.62
A5127 Trent Valley Road, West of Trent Valley Roundabout	6.4m	UAP3	1823	1645	0.90
A5127 Birmingham Road, South of Shortbutts Lane	6.9m	UAP3	1937	1498	0.77
A5127 Birmingham Road, North of Shortbutts Lane	7m	UAP3	1993	1547	0.78
A51 The Friary, North of Chesterfield Road roundabout	9.4m	UAP2	2650	1796	0.68
A51 Western Bypass, North of Bow ling Green roundabout	10m	UAP1	3350	2340	0.70
A51 Western Bypass, North of Eastern Avenue traffic signals	10m	UAP1	3350	2414	0.72
A51 Western Bypass, South of Eastern Avenue traffic signals	10m	UAP1	3350	2097	0.63
A5192 Eastern Avenue, East of traffic signals	7.9m	UAP1	2808	1329	0.47
A5192 Eastern Avenue, East of Grange Lane	7.5m	UAP1	2703	1592	0.59
A5127 Trent Valley Road, East of Eastern Avenue roundabout	9.15m	UAP1	3138	2455	0.78
A5192 Cappers Lane, South of Trent Valley Road roundabout	7m	UAP2	2258	2218	0.98
A5192 Cappers Lane, East of Austin Cote Lane roundabout	7.3m	UAP1	2650	1397	0.53
Austin Cote Lane, South of Cappers Lane roundabout	6.4m	UAP3	1662	1457	0.88
Ryknild Street, South of Roman Way roundabout	6.6m	UAP3	1770	643	0.36
A51 Tamworth Road, West of Ryknild Street traffic signals	7.3m	UAP3	2167	1190	0.55
A5206 London Road, South of A51 Tamworth Road traffic signals	9.3m	UAP1	3175	1639	0.52
Shortbutts Lane, West of London Road traffic signals	6.1m	UAP3	1500	219	0.15
Shortbutts Lane, West of Lichfield Southern Bypass Phase 3 leg	6.1m	UAP3	1500	259	0.17
A51 Upper St. Johns Street, South of Birmingham Road traffic signals	7.4m	UAP3	2190	1611	0.74
Rotten Row, South of Greenhill traffic signals	6.1m	UAP4	1250	800	0.64
A5127 Trent Valley Road, East of Greenhill traffic signals	6.6m	UAP3	1770	1944	1.10
A5127 Birmingham Road, West of Greenhill traffic signals	6.7m	UAP3	1823	2124	1.17
A51 St. John Street, North of Birmingham Road traffic signals	6.1m	UAP4	1250	1457	1.17
A51 The Friary, East of Bow ling Green roundabout	9.5m	UAP2	2667	1236	0.46
A5127 Birmingham Road, West of St. John Street traffic signals	7.3m	UAP3	2167	2126	0.98

5.8 Plans 5.3 and 5.4 show that the bulk of the link capacity issues in the morning and evening peak hours are located along the A5127 corridor through the city centre. This route serves the main city centre retail and employment areas.

Junction Capacities

5.9 The 2014 baseline junction capacity assessments have been repeated at all ten of the eleven key junctions for the 2029 DM scenario and the summary results presented in Table 5.3.

- 5.10 The signalised junction of Upper St. John Street / A51 Tamworth Road / A5206 London Road / Shortbutts Lane has been removed from this part of the analysis due to the significant changes that are proposed in that location in relation to the completion of Lichfield Southern Bypass. A new linked signalised junction has been designed which incorporates this junction, and the proposed junctions with London Road / Lichfield Southern Bypass and London Road / southern access to the St. John's development. The capacity analysis of this design is contained in Chapter 7.
- 5.11 As can be seen, the A51 / Eastern Avenue and A5127 / Shortbutts Lane / Fosseyway junctions still operate within design capacity in both peak periods. However, Greenhill signals just exceed capacity while the remaining seven junctions all exceed design capacity and exhibit significant levels of congestion and vehicular delays.

Table 5.3 Summary of Capacity Results for Key Junctions in Lichfield – 2029 Do-Minimum Scenario

Junction	Arm	2029 DM Traffic Flows					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
A461 / Lichfield Southern Bypass	A461 Walsall Road East	1	5	0.40	1	5	0.51
	Lichfield Southern Bypass	1	8	0.60	112	350	1.21
	A461 Walsall Road West	98	177	1.11	3	9	0.77
Pipehill (A461 / A5190) (Roundabout)	A461 North	1	5	0.59	23	46	0.98
	A461 South	1	8	0.57	32	147	1.07
	A5190	144	394	1.23	2	8	0.63
Bowling Green (A461 / A51 / The Friary)	A51 Western Bypass	176	610	1.29	127	477	1.24
	The Friary East	0	2	0.22	3	14	0.75
	Friary Avenue	0	5	0.07	0	6	0.11
	The Friary South	2	8	0.71	70	266	1.17
	Walsall Road	107	368	1.24	20	103	1.01
Sainte Foy Avenue / A5127 / The Friary	The Friary	4	15	0.80	2	9	0.70
	Birmingham Road East	1	7	0.59	32	81	1.02
	Birmingham Road South	7	32	0.90	61	265	1.18
	Sainte Foy Avenue	223	1625	1.96	7	66	0.90
A5127 / Eastern Avenue / Cappers Lane / Valley Lane	A5192 Eastern Avenue	176	727	1.37	212	945	1.40
	A5127 Burton Road	493	1813	1.62	246	938	1.39
	A5192 Cappers Lane	140	561	1.26	481	2177	1.71
	A5127 Trent Valley Road	33	148	1.06	231	1251	1.46
	Valley Lane	1	20	0.51	0	12	0.30
Cappers Lane / Europa Way / Austin Cote Lane	Cappers Lane West	78	180	1.11	3	10	0.76
	Europa Way	0	7	0.36	9	51	0.93
	Cappers Lane East	2	9	0.67	7	36	0.90
	Austin Cote Lane	18	71	0.98	2	12	0.67

Junction	Arm		2029 DM Traffic Flows					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
A51 / Eastern Avenue	A51 North	L	11	11	52.3	3	4	23.2
		S	15	48	74.9	9	36	47.2
		SR	17	50	78.7	11	37	53.4
	Eastern Avenue	L	4	15	20.9	6	30	29.7
		SR	13	61	79.5	18	63	83.7
	A51 South	LS	13	14	56.0	28	17	83.9
		R	14	57	79.7	8	55	68.6
	Hedgehog Access	LSR	-	-	-	-	-	-
	Degree of Saturation		79.7%			83.9%		
Practical Reserve Capacity		13.0%			7.3%			
Greenhill (Rotten Row / A5127)	A5127 Church Street	LS	28	33	83.7	31	32	84.2
		R						
	Rotten Row	LS	16	76	89.2	8	56	68.5
		R						
	A5127 Birmingham Road	LS	36	40	91.4	35	36	89.0
		R						
	Greenhill	LS	5	47	36.5	6	49	45.9
		R						
	Degree of Saturation		91.4%			89.0%		
Practical Reserve Capacity		-1.6%			1.2%			
Shortbutts Lane / A5127 / Fosseway	A5127 North	LSR	15	13	69.8	11	10	60.3
	Shortbutts Lane	LSR	5	57	67.3	4	54	58.5
	A5127 South	LSR	8	10	50.5	8	8	48.5
	Fosseway	LSR	3	41	33.4	41	41	9.8
	Degree of Saturation		69.8%			60.3%		
	Practical Reserve Capacity		28.9%			49.2%		
St. John Street / A5127 / Upper St. John Street.	St. John Street	LS	20	35	86.8	105	466	129.6
		R						
	Birmingham Road East	L	62	226	109.9	162	440	127.8
		S						
		R						
	Upper St. John Street	L	7	18	44.7	57	275	114.0
		S						
		R						
	Birmingham Road West	LS	148	564	136.0	8	22	68.5
R								
Degree of Saturation		130.0%			131.1%			
Practical Reserve Capacity		-51.1%			-45.7%			

6. TRAFFIC IMPACT - 2029 DO-SOMETHING SCENARIOS

- 6.1 The analysis reported in the previous chapter showed that by 2029, without interventions, background traffic growth and development traffic would combine to overload most of the key junctions in Lichfield during the AM and PM peak hours.
- 6.2 The underlying assumption for this analysis was that traffic growth was unconstrained and travelling behaviour remained unchanged from the present. Previous versions of this report described the Lichfield District Integrated Transport Strategy and measured its likely impact in terms of changes in vehicular traffic. The Strategy is monitored, reviewed and updated annually – the current version (as at November 2013) can be found on SCC's website.
- 6.3 Based on previous DfT guidance on the impact of Smarter Choices initiatives (WebTAG Unit M5.2 Modelling Smarter Choices) and the 2004 document 'Smarter Choices Changing the way we Travel', Staffordshire County Council has made a judgement on the potential reduction in traffic levels in Lichfield that could be achieved with the implementation of the recommended transport strategy, balanced against the 'sustainability credentials' of the development proposals included in the Plan.
- 6.4 Lichfield is a compact city served by two rail stations and with many facilities, including the city centre, within a reasonable walking distance for many residents. The proposed Spatial Strategy enables a sustainable travel culture to be developed within Lichfield with the Strategic Development Allocations (SDA) expected to come forward as sustainable urban extensions providing local facilities and enabling trip containment. Extensive Travel Plans will also be provided by the developers which will encourage high use of sustainable modes and less single occupancy car borne trips.
- 6.5 For example, the proposed consented development at the St. John's SDA will enable trip containment with the provision of an on-site primary school and local centre. The development comes with a good Framework Travel Plan for the school and the residential development. Residents will benefit from access to an on-site sustainable travel office; new cycle links to the city centre; secure cycle storage; a new bus service; and Personalised Travel Planning. The Travel Plan aspires to achieve a 20% reduction in single occupancy car trips, and if this target is not achieved then remedial measures will be triggered which include delivery of a 'TravelSmart' scheme for up to 2,000 existing local homes.
- 6.6 'TravelSmart' provides households with individualised travel marketing and tailor-made sustainable travel information, delivering measurable and sustained reductions in car use.

- 6.7 Combining this sustainable urban extension approach with the implementation of relevant elements of the Lichfield District Integrated Transport Strategy, it is considered possible to achieve a 5% reduction in vehicle trips from new and existing residents and employees over the plan period.

2029 Do-Something Scenario

- 6.8 The 2029 DS scenario therefore assumes this 5% reduction in vehicle trips, and plans 6.1 to 6.2 show the 2029 DS traffic flows across the key network. The following sections discuss the link and junction capacity assessments based upon these traffic flows.

Link Capacities

- 6.9 The theoretical link capacities on the key network were compared to the traffic flows from the 2029 DS scenario. The results are displayed in table 6.1 and plans 6.3 and 6.4. Again an RFC of 0.85 is considered to show a link or junction is operating at, or close to, capacity. The 2029 DM results are re-iterated in the table for comparison purposes, demonstrating the effectiveness of the DS transport interventions.
- 6.10 The DS scenario provides an improvement on the DM position. As can be seen, in both peaks in the DS scenario the A5127 through the City Centre (and adjacent areas) improves but still leaves some residual issues. In the DS scenario the RFCs are less than or equal to 1 on all links except for the A5127 near to Greenhill signals and St. John Street. This scenario would arguably be acceptable in terms of urban link capacity in 2029.

Table 6.1. Link Capacities on the Key Network – 2029 Do-Something Flows

Road Name / Location	Road Width	Road Type	Total Theoretical 2-Way Flow	AM PEAK				PM PEAK			
				2029 Do-Minimum Traffic Flows (2-way)	Ratio of Flow to Capacity (RFC)	2029 Do-Something (-5%) (2-way flows)	Ratio of Flow to Capacity (RFC)	2029 Do-Minimum Traffic Flows (2-way)	Ratio of Flow to Capacity (RFC)	2029 Do-Something (-5%) (2-way flows)	Ratio of Flow to Capacity (RFC)
A5190 Lichfield Rd. Pipehill	7m	UAP1	2405	1990	0.83	1746	0.73	2087	0.87	1823	0.76
A461 Walsall Rd, South of Lichfield Southern Bypass	7m	UAP1	2405	2465	1.03	2161	0.90	2681	1.11	2340	0.97
A461 Walsall Rd, West of Bowling Green roundabout	8m	UAP2	2505	1445	0.58	1249	0.50	1299	0.52	1120	0.45
Sainte Foy Avenue, West of A5127 Roundabout	7.3m	UAP1	3350	1034	0.31	913	0.27	1255	0.37	1099	0.33
Eastern Avenue, North of Trent Valley Roundabout	7.3m	UAP1	3350	1925	0.57	1687	0.50	2076	0.62	1814	0.54
A5127 Trent Valley Road, West of Trent Valley Roundabout	6.4m	UAP3	1823	1614	0.89	1427	0.78	1645	0.90	1456	0.80
A5127 Birmingham Road, South of Shortbutts Lane	6.9m	UAP3	1937	1528	0.79	1337	0.69	1498	0.77	1308	0.68
A5127 Birmingham Road, North of Shortbutts Lane	7m	UAP3	1993	1728	0.87	1501	0.75	1547	0.78	1345	0.67
A51 The Friary, North of Chesterfield Road roundabout	9.4m	UAP2	2650	1819	0.69	1583	0.60	1796	0.68	1560	0.59
A51 Western Bypass, North of Bowling Green roundabout	10m	UAP1	3350	2396	0.72	2086	0.62	2340	0.70	2031	0.61
A51 Western Bypass, North of Eastern Avenue traffic signals	10m	UAP1	3350	2621	0.78	2279	0.68	2414	0.72	2093	0.62
A51 Western Bypass, South of Eastern Avenue traffic signals	10m	UAP1	3350	2203	0.66	1918	0.57	2097	0.63	1822	0.54
A5192 Eastern Avenue, East of traffic signals	7.9m	UAP1	2808	1599	0.57	1390	0.50	1329	0.47	1153	0.41
A5192 Eastern Avenue, East of Grange Lane	7.5m	UAP1	2703	1570	0.58	1363	0.50	1592	0.59	1377	0.51
A5127 Trent Valley Road, East of Eastern Avenue	9.15m	UAP1	3138	2403	0.77	2139	0.68	2455	0.78	2187	0.70
A5192 Cappers Lane, South of Trent Valley Road	7m	UAP2	2258	2300	1.02	2032	0.90	2218	0.98	1958	0.87
A5192 Cappers Lane, East of Austin Cote Lane roundabout	7.3m	UAP1	2650	1401	0.53	1239	0.47	1397	0.53	1233	0.47
Austin Cote Lane, South of Cappers Lane roundabout	6.4m	UAP3	1662	1426	0.86	1255	0.76	1457	0.88	1277	0.77
Rvknild Street, South of Roman Way roundabout	6.6m	UAP3	1770	881	0.50	779	0.44	643	0.36	572	0.32
A51 Tamworth Road, West of Rvknild Street traffic signals	7.3m	UAP3	2167	1126	0.52	995	0.46	1190	0.55	1046	0.48
A5206 London Road, South of A51 Tamworth Road traffic	9.3m	UAP1	3175	1374	0.43	1215	0.38	1639	0.52	1446	0.46
Shortbutts Lane, West of London Road traffic signals	6.1m	UAP3	1500	228	0.15	197	0.13	219	0.15	189	0.13
Shortbutts Lane, West of Lichfield Southern Bypass Phase 3	6.1m	UAP3	1500	324	0.22	279	0.19	259	0.17	222	0.15
A51 Upper St. Johns Street, South of Birmingham Road	7.4m	UAP3	2190	1395	0.64	1225	0.56	1611	0.74	1410	0.64
Rotten Row, South of Greenhill traffic signals	6.1m	UAP4	1250	762	0.61	662	0.53	800	0.64	694	0.55
A5127 Trent Valley Road, East of Greenhill traffic signals	6.6m	UAP3	1770	1813	1.02	1598	0.90	1944	1.10	1714	0.97
A5127 Birmingham Road, West of Greenhill traffic signals	6.7m	UAP3	1823	1859	1.02	1646	0.90	2124	1.17	1883	1.03
A51 St. John Street, North of Birmingham Road traffic signals	6.1m	UAP4	1250	1252	1.00	1090	0.87	1457	1.17	1264	1.01
A51 The Friary, East of Bowling Green roundabout	9.5m	UAP2	2667	1366	0.51	1186	0.44	1236	0.46	1073	0.40
A5127 Birmingham Road, West of St. John Street traffic	7.3m	UAP3	2167	2038	0.94	1787	0.82	2126	0.98	1869	0.86

Junction Capacities

- 6.11 The 2029 DM junction capacity results were discussed in Chapter 5, showing that without any transport interventions seven of the ten junctions will suffer from significant congestion.
- 6.12 Table 6.2 displays the results of all DS capacity assessments with plans 6.3 and 6.4 providing this information geographically. The results demonstrate that there is an improvement on the DM situation, with more junctions operating within acceptable limits and in most cases the junctions that still fail are significantly less overloaded.
- 6.13 It can be seen that three of the ten junctions are now within capacity (i.e. <85% for roundabouts and 90% for signalised junctions), with a further two junctions less than, or equal to, 100% saturated. These are:

Less than 85% / 90% of capacity:

- A51 / Eastern Avenue
- Shortbutts Lane / A5127 / Fosseway
- Greenhill
 - This capacity of this junction will be further improved as part of the Friarsgate development. Pedestrian facilities within the junction will be improved allowing more green time for vehicular traffic. In addition, the signals will also be linked with other traffic signals along A5127 to improve traffic throughput along the whole corridor.

Less than (or equal to) 100% of capacity:

- A461 / Lichfield Southern Bypass
 - Cappers Lane / Europa Way / Austin Cote Lane
 - A mitigation scheme has been secured for this junction through the planning consent for Streethay Strategic Development Allocation (SDA). See Chapter 7.
- 6.14 The remaining five junctions will operate in excess of 100% of their capacity without further intervention, and are discussed in more detail later in Chapter 7. These are:
- Sainte Foy Avenue / A5127 / The Friary
 - Bowling Green
 - A5127 / Eastern Avenue / Cappers Lane / Valley Lane
 - St. John Street / A5127 / Upper St. John Street
 - Pipehill

Table 6.2 Summary of Capacity Results for Key Junctions in Lichfield – 2029 Do-Something Scenarios

Junction	Arm	2029 DS Traffic Flows 5% Smarter Travel Reduction					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
A461 / Lichfield Southern Bypass	A461 Walsall Road East	1	4	0.34	1	4	0.43
	Lichfield Southern Bypass	1	6	0.51	22	78	1.00
	A461 Walsall Road West	17	40	0.96	2	7	0.67
Pipehill (A461 / A5190) (Roundabout)	A461 North	1	4	0.52	6	13	0.85
	A461 South	1	6	0.47	4	23	0.80
	A5190	36	97	1.03	1	6	0.54
Bowling Green (A461 / A51 / The Friary)	A51 Western Bypass	64	185	1.11	39	129	1.05
	The Friary East	0	2	0.19	2	10	0.65
	Friary Avenue	0	5	0.06	0	5	0.09
	The Friary South	2	6	0.61	12	59	0.95
	Walsall Road	16	68	0.98	5	29	0.84
Sainte Foy Avenue / A5127 / The Friary	The Friary	2	10	0.70	2	7	0.60
	Birmingham Road East	1	5	0.49	5	15	0.84
	Birmingham Road South	3	13	0.74	8	44	0.91
	Sainte Foy Avenue	97	648	1.42	3	35	0.78
A5127 / Eastern Avenue / Cappers Lane / Valley Lane	A5192 Eastern Avenue	65	231	1.15	99	458	1.22
	A5127 Burton Road	296	1027	1.45	114	444	1.22
	A5192 Cappers Lane	55	190	1.10	296	1371	1.51
	A5127 Trent Valley Road	10	55	0.94	126	660	1.29
	Valley Lane	1	16	0.41	0	12	0.26
Cappers Lane / Europa Way / Austin Cote Lane	Cappers Lane West	15	47	0.96	2	7	0.66
	Europa Way	0	6	0.32	3	17	0.75
	Cappers Lane East	1	7	0.57	3	14	0.74
	Austin Cote Lane	4	21	0.83	1	9	0.55

Junction	Arm		2029 DS Traffic Flows 5% Smarter Travel Reduction					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
A51 / Eastern Avenue	A51 North	L	9	10	45.4	2	4	19.9
		S	12	44	64.8	7	34	39.8
		SR	14	45	68.8	9	35	45.3
	Eastern Avenue	L	3	14	18.2	5	17	26.2
		SR	11	54	69.1	14	47	72.6
	A51 South	LS	11	13	48.8	21	24	72.9
		R	11	50	69.3	7	62	63.0
	Hedgehog Access	LSR	-	-	-	-	-	-
	Degree of Saturation		69.3%			72.9%		
Practical Reserve Capacity		29.8%			23.5%			
Greenhill (Rotten Row / A5127)	A5127 Church Street	LS	21	25	73.6	22	24	72.4
		R						
	Rotten Row	LS	11	61	78.9	7	55	62.1
		R						
	A5127 Birmingham Road	LS	25	27	79.6	25	26	77.8
		R						
	Greenhill	LS	4	46	32.3	6	50	42.1
		R						
	Degree of Saturation		79.6%			77.8%		
Practical Reserve Capacity		13.1%			15.7%			
Shortbutts Lane / A5127 / Fosseway	A5127 North	LSR	11	10	59.9	9	8	52.7
	Shortbutts Lane	LSR	5	54	60.0	3	50	50.3
	A5127 South	LSR	7	8	43.1	6	7	7.3
	Fosseway	LSR	2	42	31.0	1	41	41.1
	Degree of Saturation		60.0%			52.7%		
	Practical Reserve Capacity		49.9%			70.9%		
St. John Street / A5127 / Upper St. John Street.	St. John Street	LS	16	32	81.0	53	252	112.3
		R						
	Birmingham Road East	L	18	44	89.3	87	251	113.2
		S						
		R						
	Upper St. John Street	L	6	20	41.8	19	86	98.8
		S						
		R						
	Birmingham Road West	LS	59	224	109.6	6	20	60.6
R								
Degree of Saturation		109.6%			116.7%			
Practical Reserve Capacity		-21.7%			-29.6%			

7. TRAFFIC IMPACT – 2029 DO-MINIMUM (MITIGATED) AND 2029 DO-SOMETHING (MITIGATED) SCENARIOS

- 7.1 The analyses in the previous chapter showed that several junctions will continue to exceed design capacity, even with a 5% reduction in traffic levels achieved through smarter choices initiatives within the Lichfield District Integrated Transport Strategy. However, mitigation schemes and options are now available for most of these junctions.
- 7.2 Developers of SDAs at Streethay and St. John’s (Land South of Lichfield) have recently secured planning consent, and following substantial work with SCC will deliver improvements to five junctions. A description of these improvements is contained in the following sections, along with associated capacity improvements. Two further junctions are also discussed.
- 7.3 This chapter therefore considers two final scenarios - 2029 DM (Mitigated) and 2029 DS (Mitigated). The 2029 DM (Mitigated) scenario assumes proposed mitigation schemes are built and uses the 2029 DM traffic flows. The 2029 DS (Mitigated) scenario also assumes mitigation schemes are constructed but uses the 2029 DS traffic flows (i.e. a 5% reduction for smarter travel choices). The sections below therefore analyse the capacity effects of the mitigation schemes, with plans 7.1 to 7.4 showing the results across the key network graphically.

A5127 / Sainte Foy Avenue / The Friary

- 7.4 At the planning application stage it was determined that there was a direct link between future capacity issues at this junction and the trips associated with development at St. John’s, in the south of Lichfield. The developer was therefore required to provide an improvement scheme which would mitigate traffic impact; specifically related to increased problems on the Sainte Foy Avenue approach in the AM peak hour.
- 7.5 A drawing of the scheme can be found in Appendix 7.1. It provides a widening of Sainte Foy Avenue, enabling two lanes into the roundabout from the previous junction with Maxtock Avenue. This will provide long individual left turn and straight on / right turn lanes.
- 7.6 This scheme was assessed and found to provide sufficient improvement to this arm. However, the developer was only required to consider a future year horizon of 2021. Nevertheless, Staffordshire County Council performed a sensitivity test at that time to assess the end of the Local Plan period (i.e. 2028).
- 7.7 However, the Local Plan now covers the period to 2029 and includes additional development at Deans Slade and Cricket Lane. The proposed

scheme has therefore been re-assessed using the latest traffic flow estimates for 2029 and the results are contained in the tables 7.1 and 7.2.

7.8 It can be seen that whilst the scheme mitigates the AM peak issue on Sainte Foy Avenue, the current 2029 flows also give rise to potential issues on the A5127 Birmingham Road, particularly the southern approach. It is difficult to provide a geometric improvement in this location due to the constraints imposed by the nearby railway bridge. This new capacity problem is most probably caused by additional development trips from Deans Slade and Cricket Lane. However, the problem appears to be mitigated assuming a 5% reduction in flows through smarter travel choices.

Table 7.1 Summary of Capacity Results for Proposed Improvement at A5127 / Sainte Foy Avenue / The Friary (2029 DM (Mitigated))

Junction	Arm	2029 DM (Mitigated)					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Sainte Foy Avenue / A5127 / The Friary	The Friary	8	34	0.91	2	9	0.70
	Birmingham Road East	1	7	0.60	33	81	1.02
	Birmingham Road South	7	32	0.90	61	265	1.18
	Sainte Foy Avenue	2	11	0.67	1	5	0.34

Table 7.2 Summary of Capacity Results for Proposed Improvement at A5127 / Sainte Foy Avenue / The Friary (2029 DS (Mitigated))

Junction	Arm	2029 DS (Mitigated) 5% Smarter Travel Reduction					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Sainte Foy Avenue / A5127 / The Friary	The Friary	3	13	0.76	2	7	0.60
	Birmingham Road East	1	5	0.50	5	15	0.84
	Birmingham Road South	3	13	0.74	8	44	0.91
	Sainte Foy Avenue	1	7	0.54	0	4	0.30

Bowling Green

7.9 Capacity issues linked to the St. John's development were also identified at the Bowling Green junction during the planning application stage. These were on the A51 Western Bypass and The Friary S approaches, and schemes have been agreed which mitigate these issues (See Appendix 7.2). The A51 approach will be widened to provide an extra lane on entry, and includes a filter lane from the A51 to The Friary E heading towards the city centre. The adjacent circulatory road will also be widened

to allow for the filter lane and two other circulatory lanes heading to The Friary S arm. The Friary S arm will be signalised, solving the capacity issue on that approach.

- 7.10 As with the Sainte Foy Avenue improvements, the schemes were assessed at the time of the planning application and found to provide sufficient improvement for the developer's 2021 assessment horizon, with SCC performing a sensitivity test at that time covering the 2028 Local Plan period.
- 7.11 The proposed scheme was then re-assessed using the latest traffic flow estimates for the 2029 Local Plan year including development at Deans Slade and Cricket Lane. The results are contained in the tables below.

Table 7.3 Summary of Capacity Results for Proposed Improvement at the Bowling Green (2029 DM (Mitigated))

Junction	Arm	2029 DM (Mitigated)					
		Mitigation to A51 Western Bypass arm only					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Bowling Green (A461 / A51 / The Friary)	A51 Western Bypass	2	5	0.65	1	4	0.58
	The Friary East	0	2	0.24	5	25	0.85
	Friary Avenue	0	6	0.08	0	7	0.12
	The Friary South	2	8	0.70	66	264	1.17
	Walsall Road	107	368	1.24	19	101	1.01

Table 7.4 Summary of Capacity Results for Proposed Improvement at the Bowling Green (2029 DS (Mitigated))

Junction	Arm	2029 DS (Mitigated)					
		Mitigation to A51 Western Bypass arm Only 5% Smarter Travel Reduction					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Bowling Green (A461 / A51 / The Friary)	A51 Western Bypass	1	4	0.56	1	4	0.50
	The Friary East	0	2	0.20	2	11	0.67
	Friary Avenue	0	5	0.06	0	6	0.09
	The Friary South	1	6	0.58	8	43	0.91
	Walsall Road	16	68	0.98	5	30	0.84

Table 7.5 Summary of Capacity Results for Proposed Signalised Improvement to The Friary Arm of the Bowling Green (2029 DM (Mitigated))

Junction	Arm		2029 DM (Mitigated)					
			The Friary S Signalisation 60 sec cycle					
			AM Peak			PM Peak		
		Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %	
Bowling Green (The Friary S Approach)	Gyratory	L	8	22	63.9	10	20	69.8
		R	3	17	28.8	5	16	44.9
	The Friary S	L	9	16	64.4	9	21	70.2
		R	4	12	34.7	2	13	22.9
	Degree of Saturation		64.4%			70.2%		
	Practical Reserve Capacity		39.7%			28.2%		

7.12 It can be seen that the agreed improvement scheme to the A51 Western Bypass approach accommodates the additional traffic from the proposed Greenbelt releases (See Table 7.3). However, there are significant queues and delays evident on the A461 Walsall Road approach. The Friary South arm (Greyed out in the table) will have signals installed and it's performance modelled with LinSig is reported in Table 7.5. These results show this approach to be operating within capacity.

7.13 Table 7.4 shows that if a 5% reduction in demand flows occurs as a result of people travelling by smarter travel choices, overall junction performance is acceptable. Although the A461 Walsall Road is technically over capacity with an RFC of 0.98, the attendant queues and delays are acceptably small. This will need to be monitored and reviewed through the transport strategy during the plan period, and some form of mitigation to this approach may be required by 2029. Potential developments at Deans Slade and Cricket Lane will need to consider this issue in detail through any planning application process.

A5127 / Eastern Avenue / Cappers Lane / Valley Lane

7.14 Both the 2029 DM and DS capacity assessments showed that most arms of this junction will suffer from severe congestion, and the need for a capacity improvement has already been included in the Lichfield District Integrated Transport Strategy.

7.15 Furthermore, a mitigation scheme has been designed by the developers of Streethay SDA as part of their planning consent. The proposed improvement is a new signalised junction, replacing the existing roundabout, and should be implemented prior to the 301st dwelling being occupied. Appendix 7.3 contains a plan of the proposed scheme.

7.16 The 2029 Local Plan traffic flows cannot be catered for within the developer's proposed signal solution. SCC therefore commissioned JCT Consultancy to design a scheme at this location that is capable of accommodating the flows.

7.17 JCT Consultancy developed two signalised roundabout options, both delivering sufficient capacity in 2029. An initial concept sketch for Option 1 can be seen in Appendix 7.4, which can be delivered within the existing highway boundary. Option 2 is similar but reduces the A5127 Burton Road to two lanes on entry; adds a third eastern circulatory lane; and provides an additional exit lane on Cappers Lane. Option 2 would require some land within the control of Staffordshire County Council.

7.18 A capacity assessment has been completed for Option 1 using LinSig, and the results are contained in Tables 7.6 and 7.7 for the 2029 DM (Mitigated) and 2029 DS (Mitigated) scenarios respectively.

Table 7.6 Summary of Capacity Results for Proposed Signalised Roundabout Improvement to A5127 / Eastern Avenue / Cappers Lane / Valley Lane Junction (2029 DM (Mitigated))

Junction	Arm		2029 DM (Mitigated) Signalised Roundabout Proposal (Option1)					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
A5127 / Eastern Avenue / Cappers Lane / Valley Lane	A5192 Eastern Ave	L	4	17	38.3	3	14	34.0
	A5192 Eastern Ave	A	17	48	93.9	12	26	81.8
	North Circular	A	3	5	42.0	4	6	59.9
	North Circular	A	3	5	41.8	4	5	69.7
	North Circular	R	1	6	32.0	1	9	24.6
	A5127 Burton Road	AL	13	46	90.6	8	34	76.3
	A5127 Burton Road	A	13	45	90.5	8	33	76.2
	A5127 Burton Road	A	5	21	48.3	6	28	65.0
	East Circular	A	4	5	83.4	3	3	61.5
	East Circular	R	1	4	15.1	1	3	19.1
	A5192 Cappers Lane	AL	11	41	87.3	12	36	86.7
	A5192 Cappers Lane	A	11	41	87.4	12	36	86.7
	South Circular	A	1	4	15.1	1	7	14.2
	South Circular	A	1	1	61.5	1	2	52.0
	South Circular	R	0	3	30.6	1	5	41.6
	A5127 Trent Valley	AL	6	23	56.8	9	40	83.6
	A5127 Trent Valley	A	6	23	57.0	9	39	83.4
	West Circular	A	3	6	55.2	4	5	63.3
	West Circular	R	2	6	32.5	3	6	29.7
	West Circular	R	0	3	33.0	0	3	39.0
Valley Lane	L	2	16	48.6	1	19	40.9	
Degree of Saturation		93.9%			86.7%			
Practical Reserve Capacity		-4.4%			3.8%			

7.19 It can be seen that there is slightly negative PRC (-4.4%) in the AM peak hour with the 2029 DM traffic flows. This would be acceptable in 2029 and provide an improvement on the 2014 base year situation at the existing roundabout. Furthermore, it has been calculated that the junction PRC could be improved by 2 – 3% in the AM peak if a right-turn flare was

introduced on the Eastern Avenue approach, although this may have the disadvantage of reducing storage space on the northern circulatory.

Table 7.7 Summary of Capacity Results for Proposed Signalised Roundabout Improvement to A5127 / Eastern Avenue / Cappers Lane / Valley Lane Junction (2029 DS (Mitigated))

Junction	Arm		2029 DS (Mitigated)					
			Signalised Roundabout Proposal (Option1)					
			AM Peak			PM Peak		
		Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %	
A5127 / Eastern Avenue / Cappers Lane / Valley Lane	A5192 Eastern Ave	L	3	16	33.6	3	14	30.3
	A5192 Eastern Ave	A	11	29	82.0	9	21	71.2
	North Circular	A	3	5	37.1	3	6	53.8
	North Circular	A	3	5	37.2	3	6	62.5
	North Circular	R	1	5	28.1	1	7	21.5
	A5127 Burton Road	AL	10	33	81.5	6	29	67.8
	A5127 Burton Road	A	10	33	81.3	6	29	67.8
	A5127 Burton Road	A	4	21	42.8	5	26	57.0
	East Circular	A	4	4	72.9	2	3	53.4
	East Circular	R	1	4	13.1	0	3	16.9
	A5192 Cappers Lane	AL	9	31	76.6	9	28	76.8
	A5192 Cappers Lane	A	9	31	76.6	9	28	76.9
	South Circular	A	1	4	12.7	1	8	12.4
	South Circular	A	1	1	55.1	1	2	46.3
	South Circular	R	0	3	27.1	1	5	36.4
	A5127 Trent Valley	AL	5	22	50.4	7	32	73.7
	A5127 Trent Valley	A	5	22	50.4	7	32	73.7
	West Circular	A	3	6	48.6	4	5	55.8
	West Circular	R	2	7	28.2	2	6	25.3
	West Circular	R	0	3	29.3	0	3	35.5
Valley Lane	L	1	11	36.9	1	15	31.4	
Degree of Saturation		82.0%			76.9%			
Practical Reserve Capacity		9.8%			17.0%			

- 7.20 The 2029 DS (Mitigated) scenario (i.e. with a 5% reduction in traffic flows associated with smarter travel choices) operates well within capacity in both peak hours.
- 7.21 An analysis of the queue lengths at the circulatory signal heads demonstrates that, for both scenarios, the design offers sufficient internal storage to avoid blocking back which would affect the overall performance of other movements through the junctions.
- 7.22 The results for Option 2 have not been tabulated, but do provide additional capacity benefits. In the 2029 DM (Mitigated) scenario there are Degrees of Saturation of 87.4% and 83.6% in the AM and PM peaks respectively, whilst in the 2029 DS (Mitigated) there are DoS of 76.6% (AM) and 73.7% (PM).

- 7.23 In summary, the modelling shows that the signalised roundabout solution has more potential to provide sufficient capacity for the 2029 demand flows, and could operate at lower cycle times. A conventional junction design appears to be less desirable in capacity and road space terms.

A51 / A5206 / Shortbutts Lane / Upper St. John Street

- 7.24 Prior to the Local Plan Hearings in June and July 2013, SCC commissioned JCT Consultancy to design a network of linked traffic signals, using their industry standard software tool LinSig, encompassing the A51 Tamworth Road / A5026 London Road / Shortbutts Lane / Upper St. John Street junction (Junction 1), the new Lichfield Southern Bypass / A5206 junction (Junction 2) and the new St. John's development southern access with the A5206 (Junction 3).
- 7.25 The emerging design satisfactorily catered for both the 2021 St. John's development flows and the 2028 Local Plan traffic flows, and the developers will deliver this scheme as part of their access works.
- 7.26 The LinSig model has now been re-run with the 2029 Local Plan flows. Tables 7.8 and 7.9 contain the results for the 2029 DM (Mitigated) scenario. The latter contains a PM peak hour sensitivity test removing the pedestrian demand at Junction 1 as it is very unlikely that the pedestrian phase would be called frequently, particularly in the PM peak.
- 7.27 It can be seen that the network of junctions will operate within capacity in the AM peak hour even with the pedestrian phase called every cycle. In the PM peak Junctions 1 and 2 appear to be operating in excess of capacity. However, it is likely that Junction 1 would operate within capacity if optimised as a standalone junction, when the pedestrian phase is not called. Firstly, Table 7.9 shows that the DoS on the London Road and Shortbutts Lane approaches improve to an acceptable level (i.e. below 90%) without the pedestrian demand. Secondly, the model is holding back southbound traffic from the remaining over capacity arm (Upper St. John Street) in order to limit the traffic arriving at Junction 2, thereby reducing the overall network PRC to -14.6%.

Table 7.8 Summary of Capacity Results for Proposed Linked Signalised Junctions London Road / Lichfield Southern Bypass (2029 DM (Mitigated))

Junction	Arm		2029 DM (Mitigated)					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
J1. Upper St. John Street / A51 / London Road / Shortbutts Lane	Upper St. John St	LSR	22	49	84.9%	35	161	103.1%
	Tamworth Road	L	15	72	86.3%	9	33	48.1%
		SR	5	75	74.6%	4	77	69.6%
	London Road	LSR	17	35	87.4%	44	73	99.2%
	Shortbutts Lane	LSR	8	126	88.7%	8	172	93.4%
	Degree of Saturation		88.7%			103.1%		
Practical Reserve Capacity		1.5%			-14.6%			
J2. London Road / Lichfield Southern Bypass	London Road S	LS	17	23	66.8%	33	38	90.8%
	London Road N	SR	21	38	88.7%	39	105	101.9%
	Bypass	L	13	40	64.3%	27	97	97.5%
		R	8	82	77.9%	16	203	102.4%
	Degree of Saturation		88.7%			102.4%		
Practical Reserve Capacity		1.5%			-13.8%			
J3. London Road / St. John's Southern Development Access	London Road N	S	6	8	30.2%	3	3	26.0%
		R	0	19	3.8%	0	19	9.2%
	London Road S	LS	10	12	45.7%	16	10	63.8%
	St John's Access	L	1	52	16.0%	1	71	11.5%
		R	3	56	37.6%	2	81	42.5%
	Degree of Saturation		45.7%			63.8%		
Practical Reserve Capacity		96.9%			41.0%			
Degree of Saturation (Network)			88.7%			103.1%		
Practical Reserve Capacity (Network)			1.5%			-14.6%		

Table 7.9 Summary of Capacity Results for Proposed Linked Signalised Junctions London Road / Lichfield Southern Bypass (2029 DM (Mitigated)) – No Pedestrians

Junction	Arm		2029 DM (Mitigated) (No Pedestrians)					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
J1. Upper St. John Street / A51 / London Road / Shortbutts Lane	Upper St. John St	LSR				35	160	103.1%
	Tamworth Road	L				7	25	39.5%
		SR				4	77	69.6%
	London Road	LSR				25	24	87.8%
	Shortbutts Lane	LSR				5	97	74.8%
	Degree of Saturation					103.1%		
	Practical Reserve Capacity					-14.6%		
J2. London Road / Lichfield Southern Bypass	London Road S	LS				34	40	92.3%
	London Road N	SR				39	108	102.0%
	Bypass	L				25	82	94.9%
		R				16	203	102.4%
	Degree of Saturation					102.4%		
	Practical Reserve Capacity					-13.8%		
J3. London Road / St. John's Southern Development Access	London Road N	S				3	3	26.3%
		R				0	21	9.4%
	London Road S	LS				16	10	64.5%
	St John's Access	L				1	68	10.2%
		R				2	75	37.8%
	Degree of Saturation					64.5%		
	Practical Reserve Capacity					39.5%		
Degree of Saturation (Overall Network)						103.1%		
Practical Reserve Capacity (Overall Network)						-14.6%		

7.28 Junction 2 is the critical junction within the network, and in the PM peak there is insufficient green time to disperse all of the demand from the three competing movements. As a result the DoS is around 102%, when ideally it would be a maximum of 90%. London Road would need to be widened in order to provide additional capacity at Junction 2. However, this is unlikely to be feasible due to the constraints associated with the bridge on London Road.

7.29 Tables 7.10 and 7.11 display the capacity results for the 2029 DS (Mitigated) scenario (i.e. 5% reduction for smarter travel choices). The AM peak operates well within capacity, but the PM peak would operate just in excess of capacity. As with the 2029 DM (Mitigated), Junction 1 would most likely operate within capacity as a standalone junction, but Junction 2 continues to struggle with the levels of traffic attracted to it with the London Road N approach exhibiting a DoS of around 95%.

Table 7.10 Summary of Capacity Results for Proposed Linked Signalised Junctions London Road / Lichfield Southern Bypass (2029 DS (Mitigated))

Junction	Arm		2029 DS (Mitigated) (5% Smarter Travel Reduction)					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
J1. Upper St. John Street / A51 / London Road / Shortbutts Lane	Upper St. John St	LSR	21	47	82.5%	14	35	63.4%
	Tamworth Road	L	13	65	82.1%	11	60	75.1%
		SR	5	73	70.8%	4	75	66.5%
	London Road	LSR	15	31	82.1%	35	37	93.0%
	Shortbutts Lane	LSR	6	93	77.5%	6	147	88.6%
	Degree of Saturation		82.5%			93.0%		
Practical Reserve Capacity		9.1%			-3.4%			
J2. London Road / Lichfield Southern Bypass	London Road S	LS	15	19	61.6%	31	38	90.5%
	London Road N	SR	16	30	82.0%	26	64	94.6%
	Bypass	L	13	42	64.3%	20	57	85.6%
		R	7	78	74.1%	10	116	90.7%
	Degree of Saturation		82.0%			94.6%		
Practical Reserve Capacity		9.7%			-5.1%			
J3. London Road / St. John's Southern Development Access	London Road N	S	4	8	29.8%	3	3	25.5%
		R	0	18	3.8%	0	17	8.1%
	London Road S	LS	10	13	45.1%	15	10	61.3%
	St John's Access	L	1	48	13.5%	1	68	10.2%
		R	3	51	30.9%	2	75	36.2%
	Degree of Saturation		45.1%			61.3%		
Practical Reserve Capacity		99.4%			46.9%			
Degree of Saturation (Network)			82.5%			94.6%		
Practical Reserve Capacity (Network)			9.1%			-5.1%		

Table 7.11 Summary of Capacity Results for Proposed Linked Signalised Junctions London Road / Lichfield Southern Bypass (2029 DS (Mitigated)) – No Pedestrians

Junction	Arm		2029 DS (Mitigated) (No Pedestrians) (5% Smarter Travel Reduction)					
			AM Peak			PM Peak		
			Queue (PCUs)	Delay (Secs)	Degree of Saturation %	Queue (PCUs)	Delay (Secs)	Degree of Saturation %
J1. Upper St. John Street / A51 / London Road / Shortbutts Lane	Upper St. John St	LSR				18	52	80.9%
	Tamworth Road	L				8	29	42.1%
		SR				4	75	66.5%
	London Road	LSR				25	22	81.5%
	Shortbutts Lane	LSR				5	110	78.7%
	Degree of Saturation		81.5%					
	Practical Reserve Capacity		10.4%					
J2. London Road / Lichfield Southern Bypass	London Road S	LS				31	35	89.1%
	London Road N	SR				19	51	94.5%
	Bypass	L				20	61	87.8%
		R				10	116	90.7%
	Degree of Saturation		94.5%					
	Practical Reserve Capacity		-5.0%					
J3. London Road / St. John's Southern Development Access	London Road N	S				3	4	26.1%
		R				0	19	8.4%
	London Road S	LS				16	11	62.7%
	St John's Access	L				0	63	8.3%
		R				2	67	29.6%
	Degree of Saturation		62.7%					
	Practical Reserve Capacity		43.6%					
Degree of Saturation (Overall Network)			94.5%					
Practical Reserve Capacity (Overall Network)			-5.0%					

7.30 Given the site constraints it is doubtful whether this junction arrangement could be improved to provide further capacity beyond the plan period. For this reason, a double roundabout arrangement has also been tested and the results are presented in Tables 7.12 and 7.13. As can be seen this arrangement easily caters for the 2029 demand flows.

Table 7.12 Summary of Capacity Results for Proposed Double Roundabout Junctions London Road / Lichfield Southern Bypass (2029 DM (Mitigated))

Junction	Arm	2029 DM (Mitigated)					
		AM Peak			PM Peak		
		Queue (PCUs)	Delay (Secs)	RFC	Queue (PCUs)	Delay (Secs)	RFC
Northern Roundabout (Junction 1)	Link Road	1	3	0.45	1	4	0.60
	Upper St. John Street	1	5	0.55	1	5	0.47
	A51 Tamworth Road	1	5	0.48	1	4	0.39
Southern Roundabout (Junction 2)	A5206 London Road	1	8	0.60	4	15	0.81
	Lichfield Southern Bypass	1	5	0.51	2	9	0.68
	Link Road	1	3	0.44	1	3	0.38

Table 7.13 Summary of Capacity Results for Proposed Double Roundabout Junctions London Road / Lichfield Southern Bypass (2029 DS (Mitigated))

Junction	Arm	2029 DS (Mitigated) 5% Smarter Choices Reduction					
		AM Peak			PM Peak		
		Queue (PCUs)	Delay (Secs)	RFC	Queue (PCUs)	Delay (Secs)	RFC
Northern Roundabout (Junction 1)	Link Road	1	3	0.42	1	4	0.57
	Upper St. John Street	1	5	0.52	1	5	0.45
	A51 Tamworth Road	1	5	0.45	1	4	0.37
Southern Roundabout (Junction 2)	A5206 London Road	1	7	0.57	3	12	0.77
	Lichfield Southern Bypass	1	5	0.48	2	8	0.64
	Link Road	1	3	0.41	1	3	0.36

7.31 It has therefore been demonstrated that with the current 2029 traffic flow estimates there is a solution which provides sufficient junction capacity in this location. This could arguably be the current linked signals network design, which is being delivered by the developers of the St. John's SDA, or a bigger double roundabout solution.

7.32 However, there is a level of uncertainty contained within the traffic flows predicted for the bypass. They were estimated using an old traffic model which is not consistent with current Department for Transport (DfT) WebTAG guidance. A new DfT WebTAG compliant model will be built to inform the Major Scheme Business Case for Lichfield Southern Bypass. This will provide a better and more reliable estimate of traffic flows using the bypass and traffic re-assignment in the surrounding area resulting from the construction of the bypass.

7.33 Once this model is available, Staffordshire County Council will be able to more confidently predict whether the proposed traffic signal network design will be sufficient, or whether the more substantial double

roundabout scheme will be required. The roundabout scheme would require third party land.

Cappers Lane / Europa Way / Austin Cote Lane

- 7.34 Capacity assessments have demonstrated that this junction would exceed design capacity in the 2029 DM scenario, whilst some RFCs would be approaching 1.00 in the 2029 DS scenario (i.e. with a 5% smarter travel reduction).
- 7.35 However, following detailed analysis during the planning application process for the Streethay SDA a mitigation scheme was agreed to improve capacity at this junction, once the 401st dwelling is occupied. A copy of this improvement can be found in Appendix 7.5.
- 7.36 A capacity assessment has been completed for this improvement for the 2029 DM (Mitigated) and 2029 DS (Mitigated) scenarios and a summary of the results is contained in Tables 7.14 and 7.15. The results demonstrate that this revised junction layout operates satisfactorily at the end of the plan period. With the DM traffic flows the Cappers Lane W and Austin Cote Lane arms in the AM peak are above 0.85, but less than 1. However, the delays and queues would be acceptable in 2029. With a 5% reduction in traffic flows for smarter travel choices, the junction operates with some spare capacity.

Table 7.14 Summary of Capacity Results for Proposed Improvement at Cappers Lane / Europa Way / Austin Cote Lane (2029 DM (Mitigated))

Junction	Arm	2029 DM (Mitigated)					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Cappers Lane / Europa Way / Austin Cote Lane	Cappers Lane West	14	38	0.95	2	6	0.66
	Europa Way	0	6	0.31	3	15	0.75
	Cappers Lane East	1	7	0.60	3	16	0.78
	Austin Cote Lane	8	31	0.90	2	9	0.61

Table 7.15 Summary of Capacity Results for Proposed Improvement at Cappers Lane / Europa Way / Austin Cote Lane (2029 DS (Mitigated))

Junction	Arm	2029 DS (Mitigated) 5% Smarter Travel Reduction					
		AM Peak			PM Peak		
		Queue (Vehs)	Delay (Secs)	RFC	Queue (Vehs)	Delay (Secs)	RFC
Cappers Lane / Europa Way / Austin Cote Lane	Cappers Lane West	5	14	0.83	1	5	0.57
	Europa Way	0	5	0.26	2	9	0.62
	Cappers Lane East	1	6	0.51	2	9	0.64
	Austin Cote Lane	3	14	0.76	1	7	0.50

St. John Street / A5127 / Upper St. John Street

- 7.37 Earlier analysis of this junction demonstrated that it currently operates at capacity, but will exceed design capacity in 2029.
- 7.38 The junction will benefit from improvements that are required to the A5127 as part of the Friarsgate development. Such improvements include the potential implementation of an Urban Traffic Control (UTC) solution to manage demand along this corridor and the benefits of this cannot easily be assessed at this stage.

Pipehill

- 7.39 Pipehill roundabout is predicted to operate just in excess of design capacity in the AM peak by 2029, even assuming a 5% reduction due to smarter travel initiatives.
- 7.40 The issue is the A5190 from Burntwood which operates with an RFC just over 1 (1.03), with associated queues of 36 vehicles and delays of 97 seconds (Please refer to Table 6.2). Remedial work is likely to be required to address capacity issues on this approach.

8. SUMMARY AND CONCLUSIONS

- 8.1 The previous high level transport analysis of the effects of Lichfield's proposed Local Plan has been updated to include the proposed Main Modifications, which involves 900 additional homes at Deans Slade and Cricket Lane in the south of Lichfield, along with a further 12ha. of employment at Cricket Lane.
- 8.2 The analysis demonstrates that most of the key junctions within Lichfield will suffer from peak hour congestion if travel demand is left unchecked.
- 8.3 Lichfield is a compact city with two rail stations and many facilities within a reasonable walking distance for most residents. Lichfield's spatial strategy proposes to locate new development largely within the urban core, at Strategic Development Allocations on the urban fringes with ancillary development to aid containment, and employment development mainly at existing sites close to transport interchanges.
- 8.4 With the range of existing travel choices available in these locations and transport interventions specified within the adopted transport strategy, it is considered that there is sufficient potential for a 5% reduction in the number of peak hour car journeys.
- 8.5 With this reduction, and assuming the bypass is completed, conditions at some of the key junctions are improved but others will still require improvement. Mitigation schemes have been discussed and assessed and there is a reasonable expectation that the operational performance of the network can be maintained to acceptable levels with these improvements made.
- 8.6 It is recommended that the Lichfield District Integrated Transport Strategy be used to inform the development of the Infrastructure Delivery Plan and support the Strategic Development Allocations. The Transport Strategy is updated annually and is published on the County Council's website. A new SATURN traffic model will also be available in 2015 and should be used to inform Transport Assessments supporting development at Dean Slade and Cricket Lane.
- 8.7 On the balance of the available evidence the County Council is of the view that the impact of the additional housing proposed in the main modifications can be made acceptable in transport terms.