Staffordshire County Council

Transport Study Report
Cheadle Town Centre

COSTCDT6573 /Rep 003 FINAL

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Executive Summary

To meet the objectively assessed needs for future housing and new employment land across the town of Cheadle around 1,320 homes and approximately 8.86 hectares of additional employment land will need to be provided or allocated by 2026. This report aims to assess the existing 'baseline' levels of traffic through the town against predicted future traffic levels based on the above requirements having been constructed. Amey have been commissioned by Staffordshire County Council (SCC) and Staffordshire Moorlands District Council (SMDC) to undertake a Transport Study that assesses the impacts of the additional housing and employment land provision up to 2026 in terms of total development trips, queue lengths and journey times on the existing highway network around Cheadle. Currently the Core Strategy provides for around 300 dwellings per annum across the whole District. The objective of this study is to assess the characteristics of the existing highway network across the town and identify locations/routes that will be affected by the additional housing and employment land provision; and assess what impacts the resultant traffic increases across the town might have on journey times through the town, queuing and delay.

Traffic survey data collected at points across the town during December 2014, January 2015, March 2015, April 2015 and May 2015 has been used to provide a robust dataset to formulate model network development. Counts included Automatic Traffic Counts (ATC); Manual Classified Turning Counts (MCC); Automatic Number Plate Recognition (ANPR); Journey time survey; Queue length surveys and Pedestrian counts. The collected data has been further supplemented by additional count data obtained from the SCC count database. The recorded traffic flows were used to assess impacts on the highway network using the microsimulation software VISSIM.

A comparison of modelled traffic flows for the 'with' and 'without' development scenarios showed only slightly greater traffic flows during the AM Peak. Journey time, queuing and delay resulting from traffic associated with the above future housing and employment land requirements having been constructed (against the baseline position) showed only negligible increases, with the overall network within Cheadle generally still operating within capacity.

During the PM Peak however, conditions were somewhat more strained with numerous links already operating close to or at capacity during the without-development scenario. Of particular note were the A522 Tape Street and B5417 Queen Street links, where prolonged traffic queuing was modelled. Conditions on these links were further exacerbated in the post development scenario with greatly reduced spare capacity and reduced ability to successfully discharge flows.

Following the assessment of operational capacities within Cheadle's existing road network with the addition of trips predicted from development anticipated until 2026, several further actions have been recommended. These include:

- Investigation into highway improvements on the existing network to mitigate future issues highlighted including the introduction of pinch point improvements to increase existing capacities at key junctions,
- Investigation into existing Traffic Regulation Order's (TRO) for the loading/unloading of HGV's along the High Street, and
- Revisions to the Cheadle Town Centre signing strategy. A strategy will need to be agreed to sign HGV's through / around Cheadle.

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1 Introduction

1.1 Background

Amey has been jointly commissioned by Staffordshire County Council (SCC) and Staffordshire Moorlands District Council (SMDC) to undertake a transport study of the potential impact of various developments proposed for Cheadle as part of meeting the town's future housing and employment land requirements under the Local Development Framework (LDF), on the highway network around Cheadle town centre.

As part of the Local Plan, approximately 1,320 new homes and approximately 8.86 hectares of additional employment land have been identified as needing to be provided /allocated by 2026 across Cheadle. Note the Policy SS5C of the Council's adopted Core Strategy, sets out the prioritisation of 'broad locations' and other areas for future housing, and broad locations for employment land around Cheadle.

Concerns have been raised regarding the performance of the existing highway network in the town and what impact any additional developments in/around the town may have.

The objectives of this study are to:

- Assess the operation of the existing highway network across the town,
- Assess the future highway network across the town having factored in the predicted additional housing and employment land required under SMDC's LDF to 2026, and
- Identify highway locations across the town that will be impacted by the future development flows predicted from this additional development, which may require further investigation to mitigate.

1.2 Site Description

Cheadle is a market town within the Staffordshire Moorlands District area. It is ideally located for visitors to the Moorlands, Trentham and the Alton Towers Resort Theme Park located just 5 miles east of Cheadle. As such, the town centre attracts volumes of 'through traffic' associated with tourism, leisure and recreation.

Traditionally the history and heritage of Cheadle is rooted in agriculture and industry, particularly the processing and manufacturing of copper and open-cast mining of coal. More recently, a significant employer within the town is JCB which has three factories in/around Cheadle (two on Leek Road and one on Uttoxeter Road) and its main headquarters in nearby Rocester. Further to this, the town is home to St. Giles Catholic Church and plays host to regular market days and events. A location plan of the surrounding area and notable features is shown in Figure 1-1.

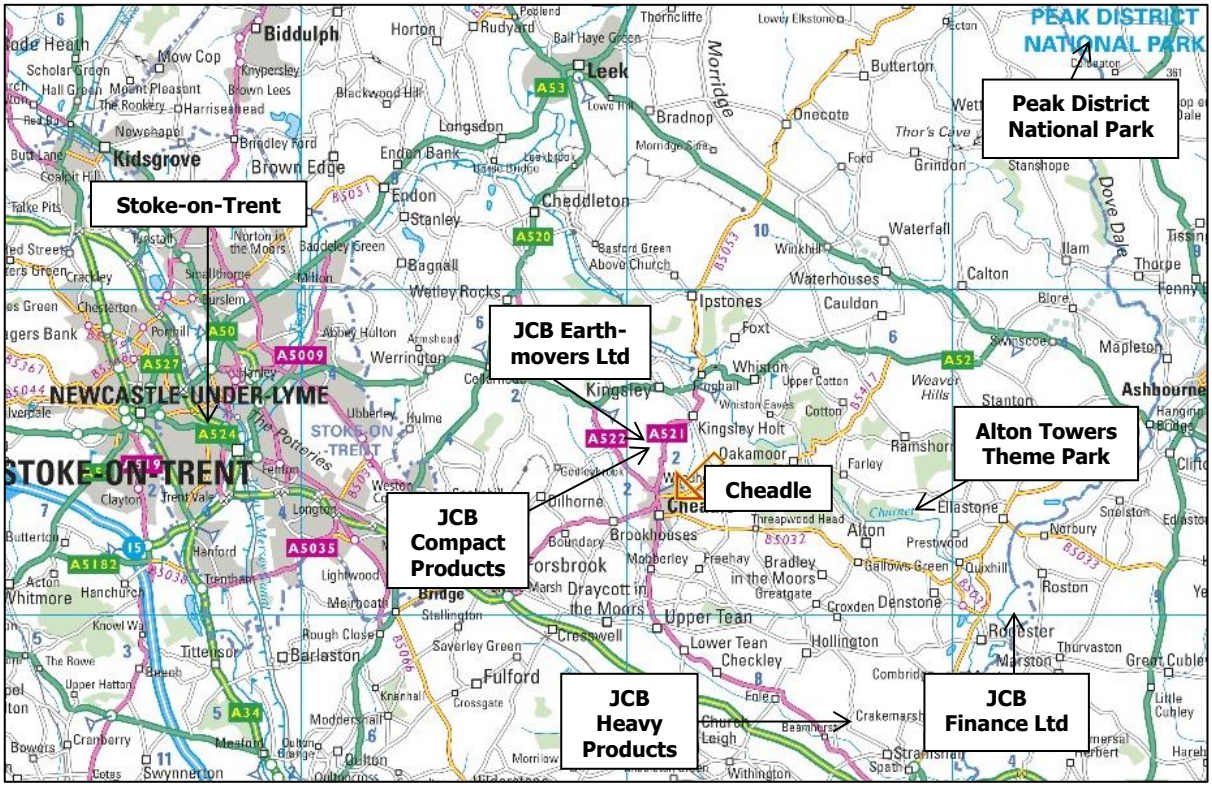


Figure 1-1 Site Location and surrounding area

The primary routes of the A521 and A522 run through the town centre, the former of which forms part of the main high street where the majority of the retail outlets are located.

On the west side of the town centre the A521 High Street, Cross Street, Bank Street and The Terrace form a single lane gyratory system which can be seen in Figure 1-2. The one-way A521 High Street, the two-way A522 Tape Street and A521 Chapel Street from the main routes on the east side of the town centre.

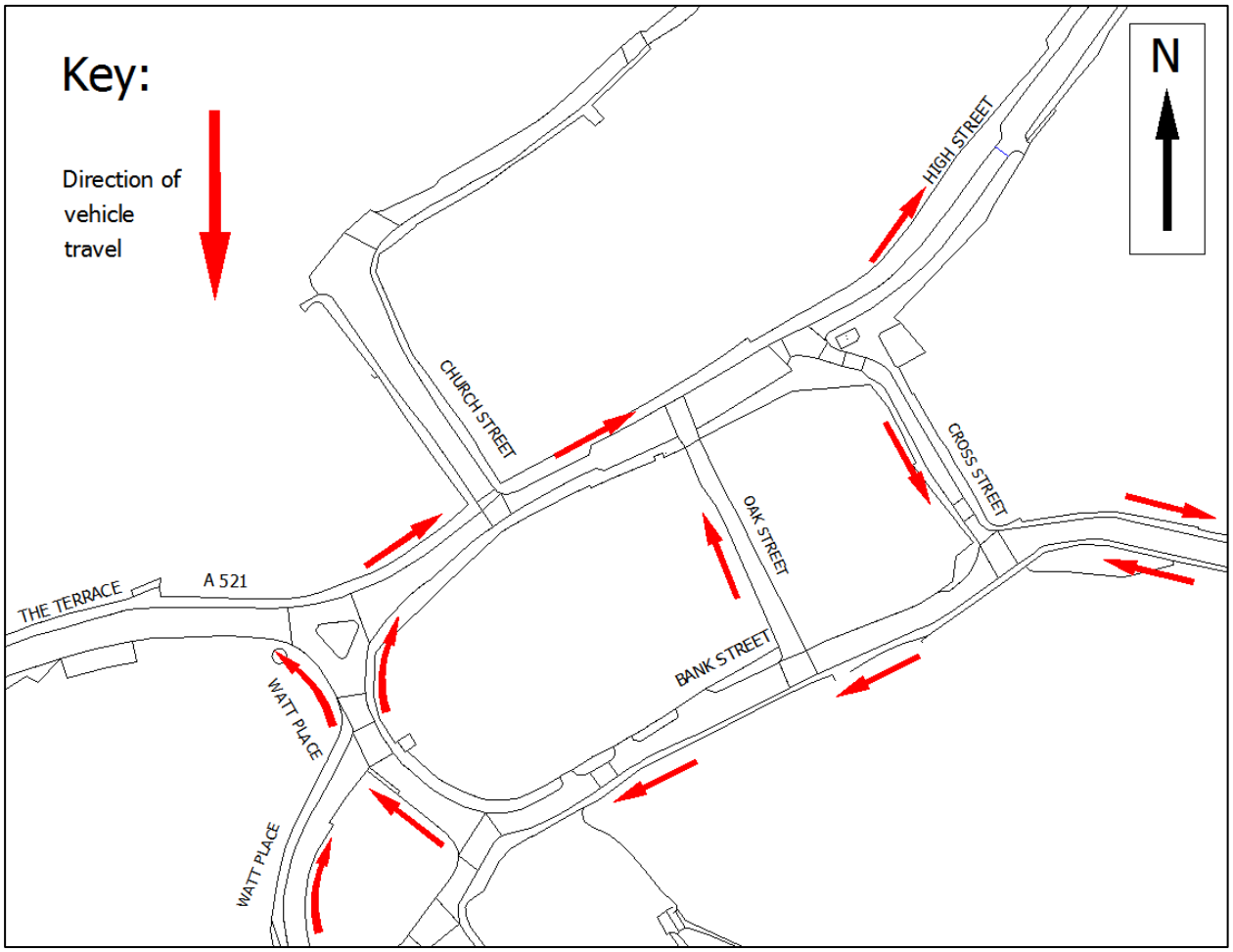


Figure 1-2 Diagram of the Cheadle Town Centre gyratory

Travelling eastbound along the A521 'The Terrace' & High Street, vehicle overtaking is constrained due to the highway width being as narrow as 3.5 metres at certain points. Consequently goods vehicles unloading can cause disruption to traffic flows and connectivity to other facilities within the town or the shopping environment.

The A522 runs north-south through the town centre, intersecting Chapel Street, the A521 High Street and the B5417 Queen Street. These junctions are critical to the overall functioning of the highway network in and around Cheadle, with any congestion impacting connectivity between the north east quarter of the town and the nearby JCB factories.

Anecdotal evidence from residents as corresponded from the Local Authority suggests there are noteworthy periods of queuing and congestion along both the A521 and A522 links through the town centre area.

2 Study Methodology

2.1 Introduction

To meet the objectives of this study as set out in Section 1.1, the VISSIM microsimulation modelling tool, has been used to assess both the existing and future highway network performance. The baseline traffic models of Cheadle Town Centre have been constructed in accordance with the following guidance:

- Design Manual for Roads & Bridges (DMRB) Volume 12a,
- Department for Transport (DfT) WebTAG (Transport Appraisal Guidance - Updated 2012 and 2014), and
- Traffic Modelling Guidance (TfL) v3.0.

An overview of the model development methodology used can be seen in Figure 2-1.

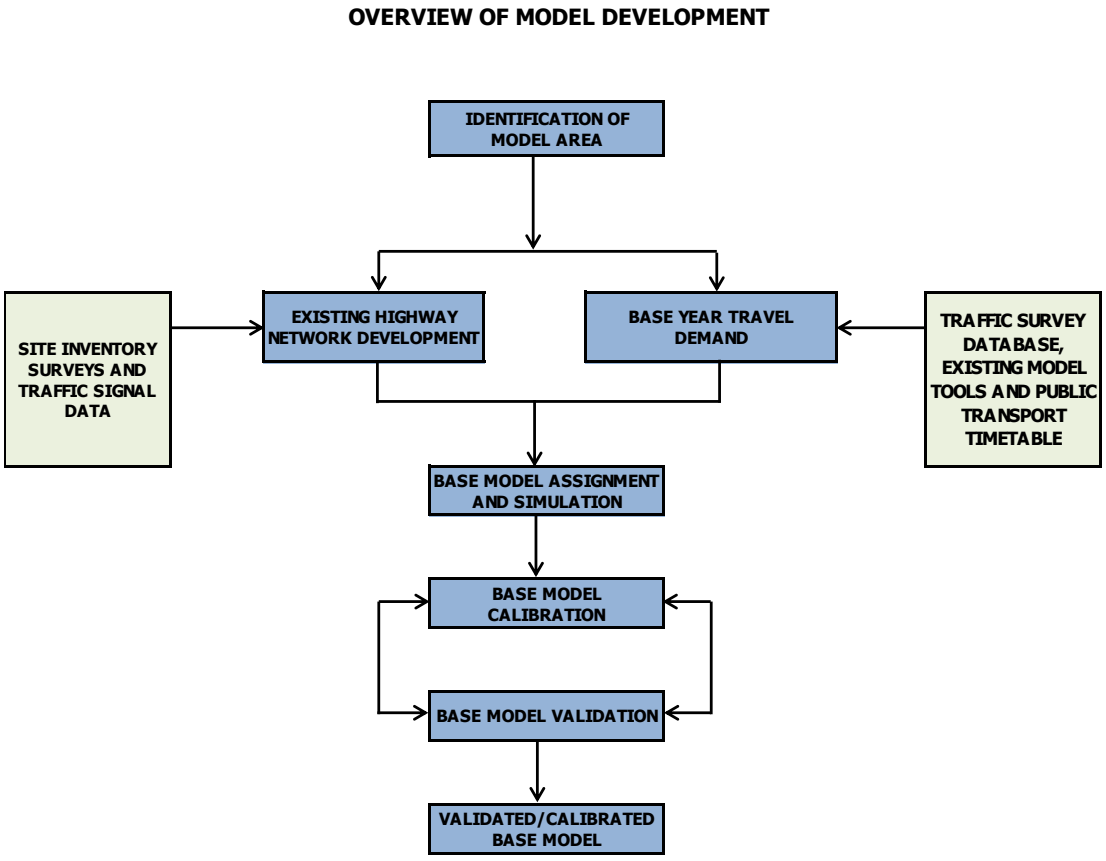


Figure 2-1 Overview of Baseline Model Development

VISSIM is a microsimulation software tool used to model vehicle interactions and driving behaviours on the highway road network. This includes the interactions at both priority and signal controlled junctions and roundabouts.

VISSIM has a graphical user interface that allows the operator to add traffic and signal data to existing base maps of intersections and road layouts. This unique capability not only reduces the workload required for data input but also dramatically improves the animation quality of traffic and transit operations. In contrast to other simulation models, VISSIM's sophisticated vehicle simulation model allows the user to accurately analyse traffic transit interactions, such as kerbside bus stops or complex traffic operations associated with weaving sections and merges.

VISSIM is able to analyse traffic and transit operations under constraints such as lane configuration, traffic composition, traffic signals, transit stops, etc. thus making it a valuable tool for the evaluation of various alternatives based on transportation engineering and planning measures. Besides its animation capabilities, VISSIM can generate numerous user-customisable output files. This information includes:

- Travel time, speed and delay statistics,
- Queue length statistics,
- Network performance statistics, and
- Signal timing information.

2.2 Model Development Methodology

The type and complexity of a traffic model depends on the scale of the scheme that is proposed. It is considered that the development proposals for the area of Cheadle Town Centre may result in changes to travel patterns within the area. An appropriate methodology has therefore been developed, which in particular is sufficiently detailed to:

- Replicate observed existing traffic flow conditions, and
- Understand the impact of the future schemes and developments within the model area.

2.2.1 Model Periods

The DMRB recommends that *"in congested urban areas the variation of travel times and costs throughout the day is complex. When modelling these areas it is usually necessary to break the day down into separate periods covering AM and PM Peak periods for weekdays*." The following two periods have therefore been developed in the model platform in order to represent observed periods of distinctly different traffic conditions.

- AM Period (0800-0900), and
- PM Period (1700-1800).

The two model periods are run with a 15 minute 'preload' which enables a representative level of traffic to warm up the network before data is collected during the designated periods.

2.2.2 Model Calibration and Validation

Having prepared the necessary network and traffic data for the base models, they were subjected to an iterative process of calibration and validation. This was carried out in accordance with the DMRB guidance.

Calibration is an iterative process in which the models are revised in order that the most accurate replication of the base year (2014/2015) conditions is achieved. This included:

- Comparison between the observed and modelled link flows and queue lengths,
- Network and junction revisions in order to ensure accurate representative modelling of existing conditions – including observed queue lengths,
- Logic checks on the assigned traffic turning proportions at junctions throughout the model area, and
- Further logic checks to ensure representative number of trips included in the network.

The purpose of model validation is to provide an independent demonstration that the model truly reflects existing traffic conditions. The validation procedure demonstrates the satisfactory operation of the modelling platform and ensures that the tool is both robust, and suitable for further use and development. The DMRB contains guidance on quantifiable thresholds which the assignments should seek to achieve. This includes an assessment of:

- Observed and modelled traffic flow data,
- Statistical analysis (GEH Statistic), and
- Observed and modelled journey time data.

2.3 Traffic Data Collection

To accurately develop a traffic model which reflected existing travel patterns on the road network in Cheadle, Amey undertook a significant data collection exercise (supplemented by data from SCC) and used future development data provided by SMDC. Traffic surveys were commissioned initially for the period 16th – 22nd December 2014 and between 5th – 11th January 2015, these dates being within the Staffordshire School term time, which is normal practice for gathering survey data, unless there are specific reasons to survey outside of school term time. The purpose of this data was to:

- Provide base information to facilitate model network development, with data including on-site observations of both junction and link characteristics,
- Ensure the model realistically replicated observed highway network conditions through the collection of journey time and queue length data (which account for the delays at multiple junctions in the calculation of overall travel times) and which provide important data against which the model can be validated,
- Determine the pattern and behaviour of vehicular traffic on the highway network so that base year conditions could be replicated and assertions made about likely future year changes, and
- Provide a count database permitting the detailed validation of the traffic model in order to demonstrate confidence in the modelled flows, thus ensuring they are sufficiently robust for subsequent use in any future scheme appraisal.

Vehicles were classified into the following categories – aligned to DfT classifications:

i. Cars and taxis (CAR),
ii. Light Goods Vehicles (LGV),
iii. Other Goods Vehicles type 1 (OGV1) - 2 or more rigid axles with twin rear wheels,
iv. Other Goods Vehicles type 2 (OGV2) – articulated with 4 or more axles,

v. Public Service Vehicles (PSV),

vi. Motorcycles (MCL), and

vii. Pedal Cycles (PCL).

2.3.1 Data Collection Surveys

The following types of traffic surveys were specified to aid the construction and development of the Cheadle model:

- Automatic Traffic Counts (ATC),
- Manual Classified Turning Counts (MCC),
- Automatic Number Plate Recognition (ANPR),
- Journey time surveys,
- Queue length surveys and
- Pedestrian counts.

2.3.2 Data Collection Locations

The data collection exercise focused on the links and junctions within the Cheadle town centre area. The focus was to ensure that the traffic model would be fully up-to-date and robust within the vicinity of the study area.

The traffic data collected from the surveys undertaken in December 2014 and January 2015 included the following data collection sites:

Link Locations

- A522 Leek Road,
- B5417 Queen Street,
- Well Street,
- B5032 Ashbourne Road,
- A522 Tean Road,
- Charles Street,
- The Birches,
- Glebe Road,

- A521 Town End,
- Park Lane,
- Car Park (Entry / Exit) located on A521 Chapel Street, and
- Car Park (Entry / Exit) located on A522 Tape Street.

Junction Locations

- Town End / Glebe Road Jct,
- Lid Lane Jct. / The Birches Jct,
- Lid Lane / Royal Walk Jct,
- A521 Bank Street / Lid Lane Jct,
- A521 Bank Street / Watt Place Jct,
- A521 Bank Street / The Terrace Jct,
- A521 Chapel Street / Oak Street Jct,
- High Street / Oak Street Jct,
- A521 Chapel Street / Cross Street Jct,
- High Street / Cross Street Jct,
- A521 Chapel Street / Charles Street Jct,
- A522 Leek Rd / A521 High Street / A522 Tape Street Jct,
- A522 Tape Street / B5417 Queen Street Jct,
- A522 Tape Street / Well Street / Chapel Street Jct,
- A522 Tape Street / B5032 Ashbourne Rd Jct, and
- A522 Tape Street / Charles Street Jct.

2.3.3 Automatic Traffic Counts

Automatic Traffic Counts (ATC) data collection was undertaken on two separate 7-day periods commencing on 16th December 2014 and 5th January 2015. Plans illustrating the exact locations of the data collection points used in the survey are provided in Figure 2-2. Plans showing the full flow movements of the survey have been provided in Appendix A1.0.

2.3.4 Manual Classified Turning Counts

Manual Classified Turning Counts (MCC) for all traffic movements were undertaken on Wednesday 17th December 2014 and Saturday 20th December 2014 during the following time periods:

- Weekday (0700-1000) and (1500-1900), and
- Saturday (1000-1400).

The data was collected in 15min intervals with locations of data collection points shown in Figure 2-2 in coloured circles.

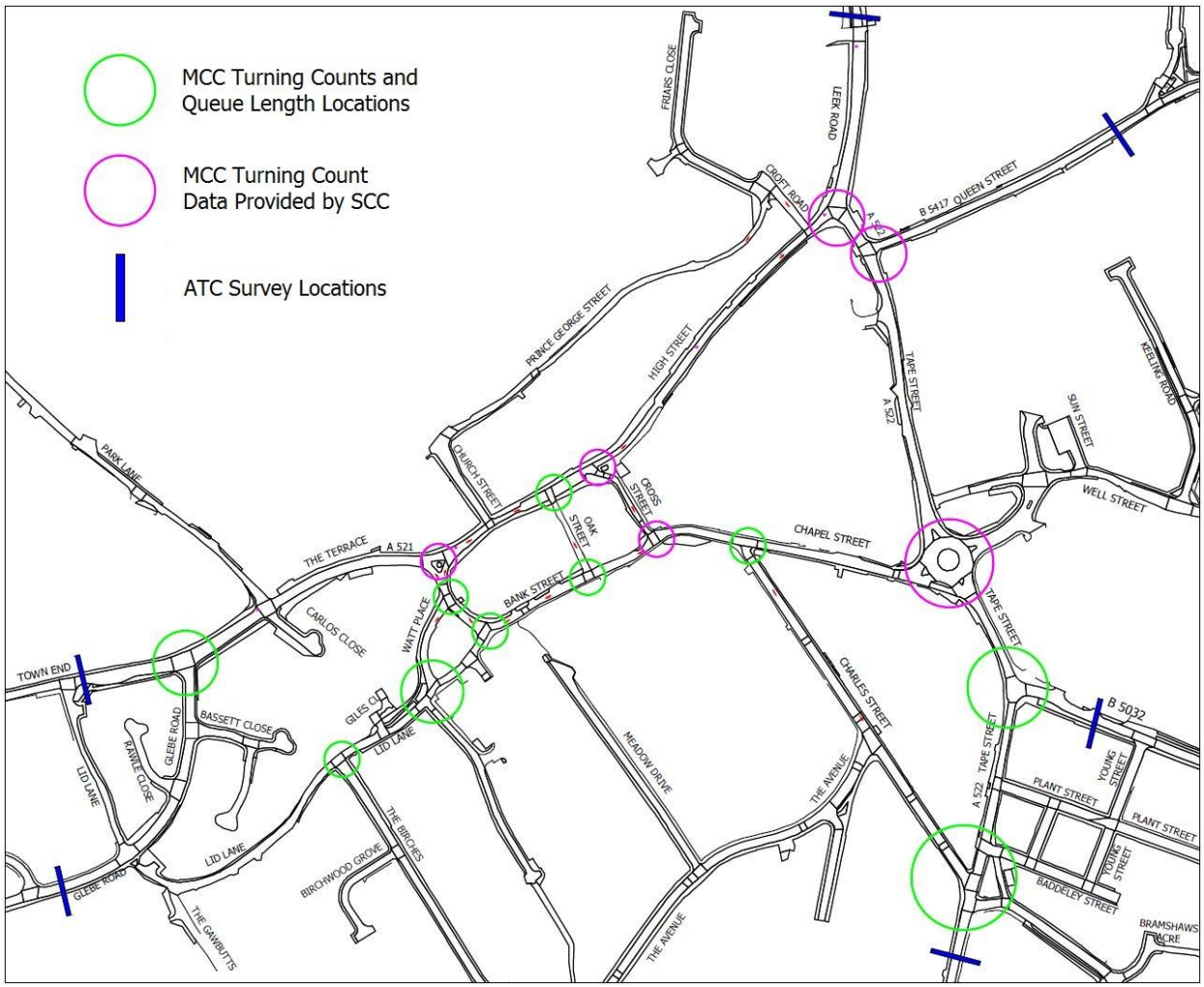


Figure 2-2 Data Survey Locations in Cheadle

The collected data was further supplemented by additional count data for December 2011 and December 2012 obtained from SCC. The combined data provided a sufficient level of coverage to form the basis for model calibration and validation. The locations of the additional surveys are shown in Figure 2-2 with the full flow movements of the survey shown in Appendix A1.1 and A1.2.

2.3.5 Automatic Number Plate Recognition

Automatic Number Plate Recognition (ANPR) surveys were undertaken at the outer cordon of the network to capture origin / destination movements through the town centre. The ANPR cameras were located at the same sites as the ATC counts. In addition, two car park entry and exit points located on A521 Chapel Street and A522 Tape Street was also undertaken.

The ANPR surveys were undertaken on Thursday 8th January 2015. The locations of the data collection points used in the ANPR survey are shown in Figure 2-3.

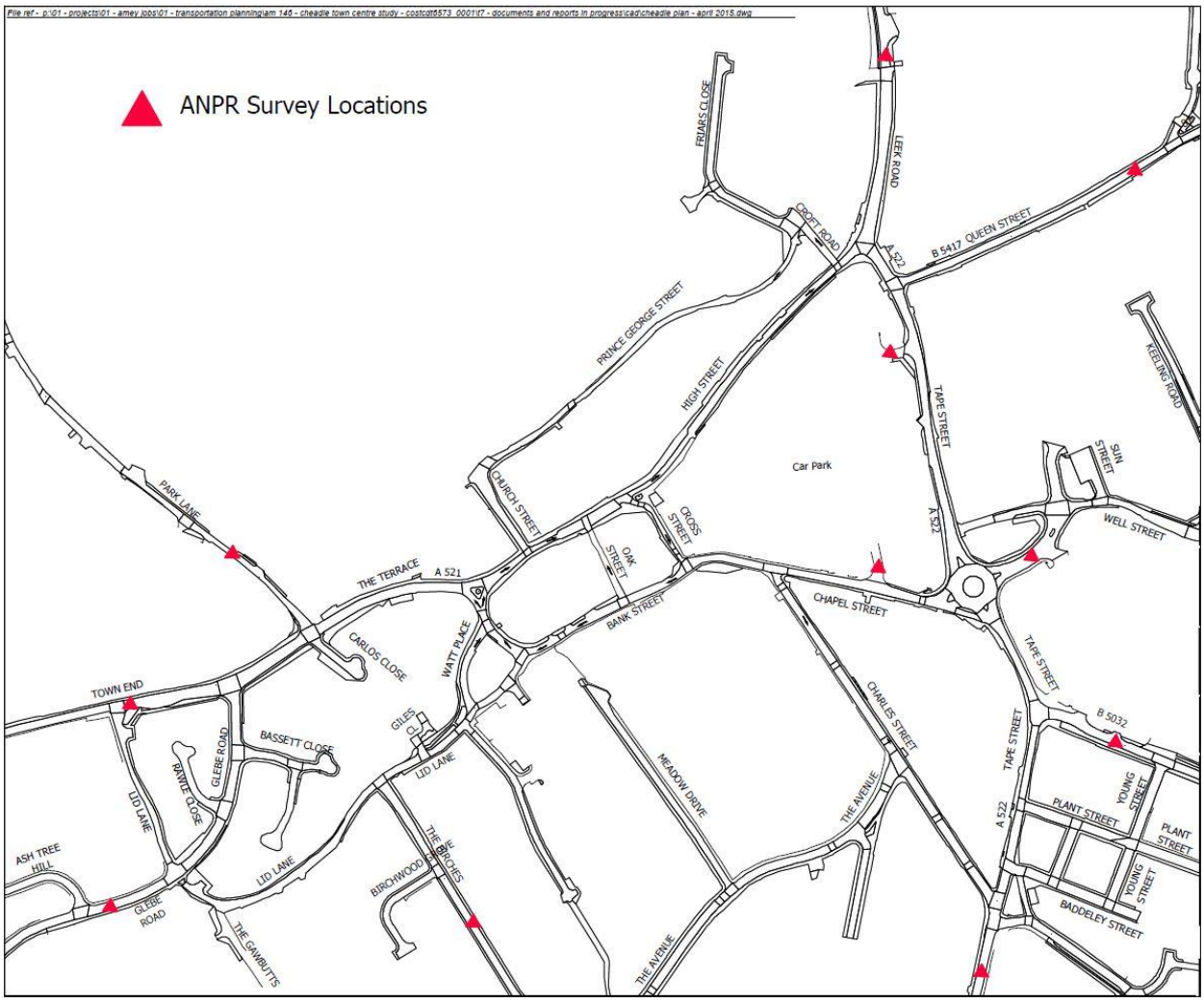


Figure 2-3 ANPR Survey Locations in Cheadle

2.3.6 Journey Time Surveys

The collection of journey time data allows assurances to be made so that the speed of traffic simulated within the model is an accurate reflection of existing highway network conditions. As such, journey time validation forms an essential part in the development of a robust model.

Journey time surveys were undertaken on 4 routes with a minimum of 6 runs per route in both directions, on 2 different days in 2 different weeks for the morning and evening peak periods. The primary journey time routes used for assessment were:

- Route 1 – A522 Tape Street to A521 Town End,
- Route 2 – B5417 Queen Street to Glebe Road,
- Route 3 – A521 Town End to B5032 Ashbourne Road, and
- Route 4 – A521 Town End to A522 Leek Road.

The routes utilised in the journey time analysis are illustrated in Figure 2-4.

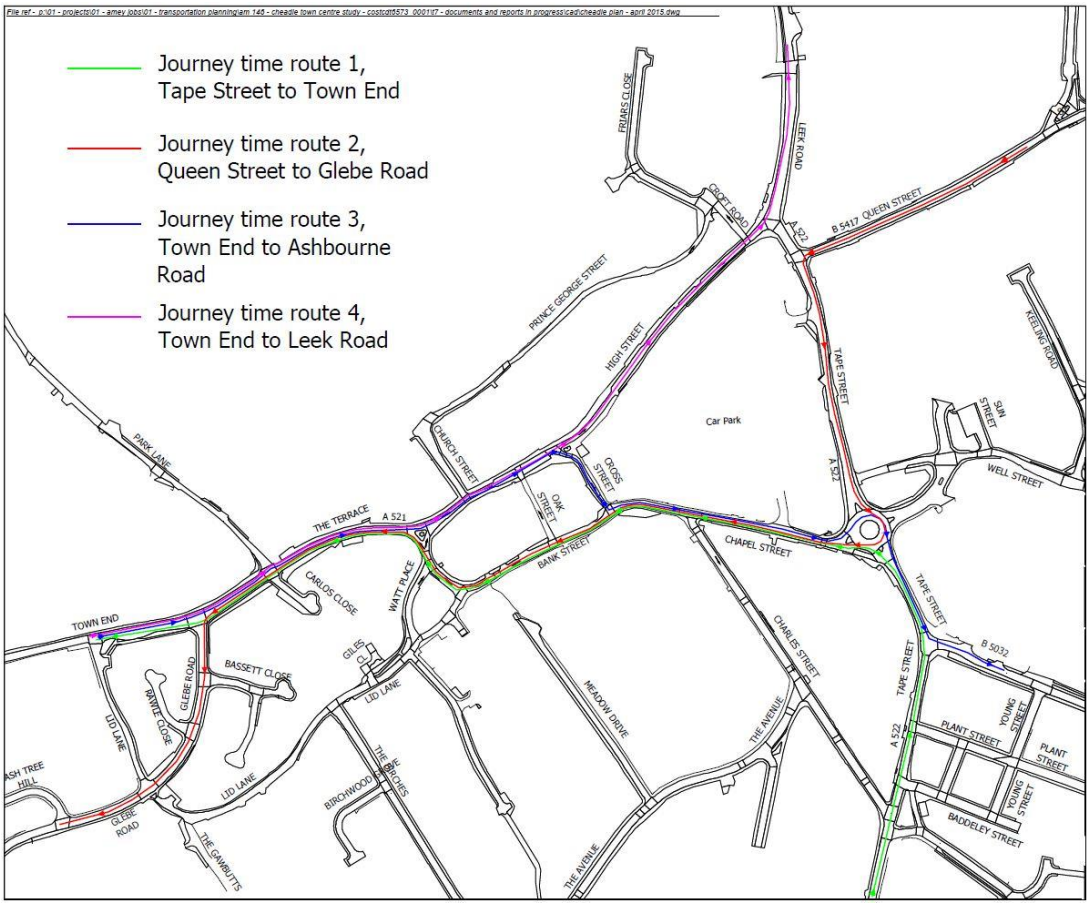


Figure 2-4 Journey Time Routes in Cheadle

2.3.7 Queue Length Surveys

Queue length observations were carried out at each site on all approaches to the junctions listed below at 5-minute intervals, by lane. Lane numbering was designated outwards from the kerb in the direction of travel. All observations were of vehicle numbers rather than a linear measurement.

Queue length observations were undertaken on Wednesday 17th December 2014 (between 07:00 - 10:00 and 15:00 - 19:00) and Saturday 20th December 2014 (between 10:00 - 14:00) at the following junction locations:

- A521 Town End / Glebe Road,
- Lid Lane / The Birches,
- Lid Lane / Watt Place / Royal Walk,
- Bank Street / Lid Lane,
- Bank Street / Watt Place,
- A521 The Terrace / A521 High Street / Watt Place,
- A521 High Street / Oak Street,
- A521 Chapel Street / Cross Street,
- A521 Chapel Street / Charles Street,
- A522 Leek Road / A522 Tape Street / A521 High Street,
- A522 Tape Street (N) / B5417 Queen Street / A522 Tape Street (S),
- A522 Tape Street (N) / Well Street / A522 Tape Street (S) / A521 Chapel Street,
- A522 Tape Street (N) / Ashbourne Road / A522 Tape Street (S),
- A522 Tape Street / Baddeley Street / Mill Road, and
- A522 Tape Street / Mill Road / Charles Street.

2.3.8 Pedestrian Counts

Pedestrian counts were undertaken to assess movements within Cheadle. The first was on Wednesday 17th December 2014 and incorporated both AM and PM Peak flow periods (07:00 – 10:00 and 15:00 – 19:00), whilst the second was completed on Saturday 20th December 2014 between 10:00 – 14:00. The surveys were conducted at the following sites within Cheadle Town Centre.

- A521 Town End / Glebe Road,
- Bank Street / Lid Lane,
- A521 High Street / Oak Street,
- A521 High Street / Cross Street, and
- A522 Tape Street (N) / Well Street / A522 Tape Street / A521 Chapel Street.

The locations of the pedestrian count surveys are illustrated in Figure 2-5.

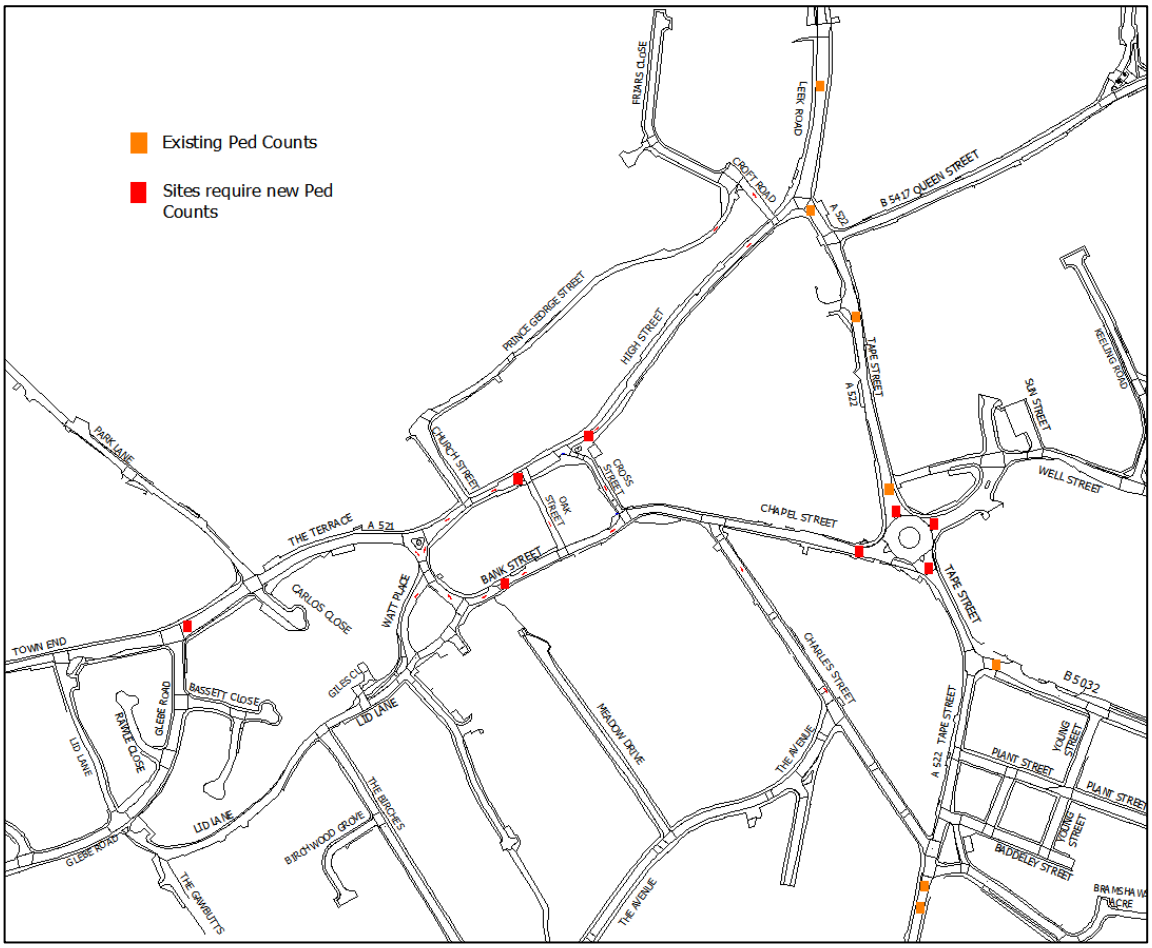


Figure 2-5 Pedestrian Count Survey Locations in Cheadle

2.3.9 Further Surveys

Following the successful completion of all the surveys mentioned previously, additional counts were commissioned to include vehicle flows associated with the Alton Towers Resort Theme Park, which in the winter months is closed. During the annual open season, the theme park attracts some 2.7million visitors (circa 28,000 guests per day). Consequently it was felt that the December/January survey data may not be fully representative of typical traffic conditions and as a result, revised counts were commissioned by SMDC during March and April 2015 to account for this and provide more robust flow figures for modelling purposes.

The updated surveys were undertaken between 27th March and 12th April 2015, the first week being Staffordshire School term time (with other areas such as Dudley and Wolverhampton being on school holidays) and the second week being all school holidays. The purpose of doing the surveys over this period was to capture both school related traffic within Cheadle during the first week, the Easter Bank Holiday weekend when potential trips through Cheadle for visitors to Alton Towers would be high, and then a week of school holiday period where again, trips to Alton Towers would be evident.

The surveys were specified to the same locations and parameters as the December-January surveys, but omitted the following elements:

- Automatic Number Plate Recognition (ANPR), and
- Pedestrian counts.

The additional ANPR surveys were not required, due to the limited route choice vehicles can take through Cheadle. Also, additional Pedestrian counts were not required as this information was adequately captured in the December surveys.

Locations of the additional ATC, MCC, Queue Length and Journey Time survey locations is shown in Figures 2-6 and 2-7.

Plans showing the full flow movements of the additional ATC surveys have been provided in Appendix B1.0, C1.0, C1.1 and C1.2 while plans showing the full MCC surveys are in Appendix C2.0, C2.1, C2.2, C2.3, C2.4 and C2.5.

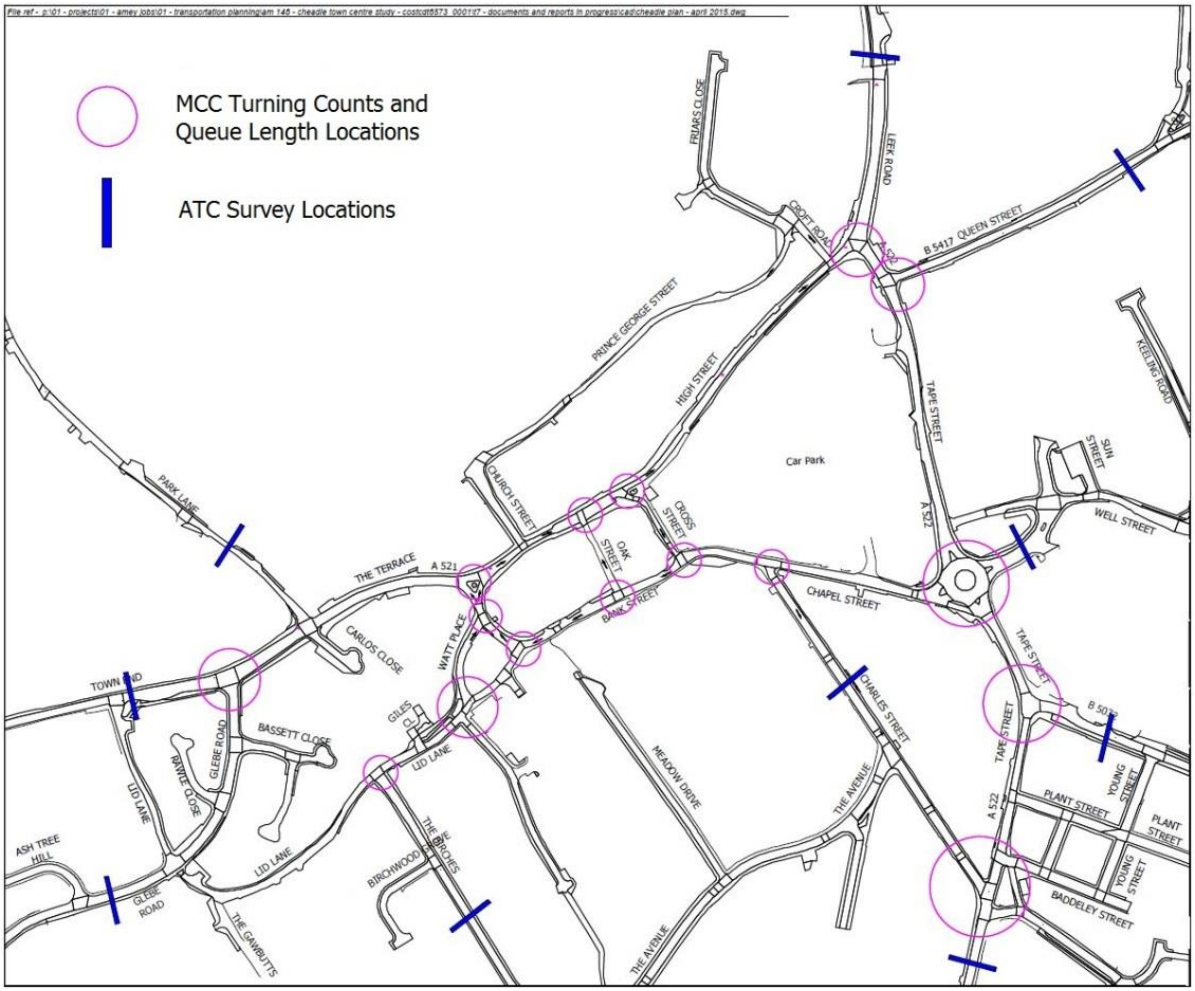


Figure 2-6 March/April 2015 Survey ATC & MCC Survey Locations

Figure 2-7 March/April 2015 Survey Journey Time Routes

2.4 Data Omissions

Due to a failure encountered with the ATC data collection loops during the 2nd week of the March / April survey, only a partial dataset was derived from 3 of the sites, these being:

- Site 1 – Leek Road (data recorded up to Thursday 9th April at 06:00),
- Site 2 - Tean Road (data recorded up to Sunday 5th April at 15:00), and
- Site 3 - Town End (data recorded up to Sunday 5th April at 08:00).

As such, additional count data was undertaken during the week commencing 24th May 2015 (this being the Whitsun holiday week) to provide a further dataset to compare to the already collected data and used for modelling purposes. These results have been included in Table 3.1.

Traffic data captured during the December 2014, January 2015, March / April 2015 and May 2015 collection periods has been carefully analysed. From these datasets, the highest flow values for each respective link have been collated and then been inputted into VISSIM for modelling purposes. It is considered the resultant dataset provides a robust platform upon which to undertake subsequent assessments.

2.5 Future Development

Policy SS5C of the Council's adopted Core Strategy sets out the prioritisation of 'broad locations' around Cheadle for future housing and employment land. Based on this and development data provided by SMDC, forecasted growth estimates within the town centre area up to the year 2026 have been derived. Forecasts suggest over the next 15 years, there will be a total housing requirement within Cheadle totalling approximately 1,320 residential properties. Of this total around 650 are anticipated to be on sites within the development boundary with the remainder on potential greenfield sites on the edge of the settlement.

Further to this, the strategic location of Cheadle makes it a viable base for commercial and business operations. The Council is required to provide/allocate (as of 2013) a residual figure of approximately 3.6 hectares of additional B-Class employment land across Cheadle. The Study maps a number of potential future employment sites (equating, approximately, to the 'broad locations' for employment for Cheadle under Core Strategy Policy SS5C). As, these options collectively exceed 3.6 hectares not all of these will be required to meet this requirement. Nevertheless, and to reflect a 'worst case scenario' in employment land development terms, the traffic impact of these three sites, totalling around 8.86 hectares, has been factored into the 'Future Development' modelling.

With regards to housing, at the 30 September 2014, 144 (net) residential properties had been completed across Cheadle with a further 141 (net) dwellings committed. The location of the employment 'broad locations' or other areas prioritised under Policy SS5C, are shown in Appendix D1.0 whilst the peak flow period trips forecast to be generated by each is summarised in Table 2-1.

Type	Site Ref	AM				PM			
		Arrival Trip (0800-0900)	Depart Trip (0800-0900)	Total Trip	Dev Trip Assignment (0800-0900)	Arrival Trip (1700-1800)	Depart Trip (1700-1800)	Total Trip	Dev Trip Assignment (1700-1800)
Housing	CH001	32	85	117	29	81	49	130	32
	CH002a	3	9	13	3	9	5	14	4
	CH002b	6	15	21	5	14	9	23	6
	CH003	7	20	27	7	19	11	30	7
	CH004	6	16	22	5	15	9	24	6
	CH006	6	16	22	5	15	9	24	6
	CH009	2	6	8	2	5	3	9	2
	CH013	7	18	24	6	17	10	27	7
	CH015	4	11	16	4	11	7	17	4
	CH020	6	15	21	5	14	9	23	6
	CH024	6	16	22	5	15	9	24	6
Employment	CH127	285	43	327	82	34	248	282	70
	CH019	221	33	255	64	26	193	219	55
	CH143	85	13	97	24	10	74	84	21
TOTALS		**676**	**316**	**992**	**246**	**285**	**645**	**930**	**232**

Table 2-1: Predicted Development figures up to 2026

The predicted future development forecast trips included in the modelling assessment have been provided by SCC with two pieces of information provided. The first was trip distribution of employees at JCB based upon staff surveys. The percentage of these assigned onto the Cheadle study area were based on workforce home postcodes and it was assumed that 50% of these employees were car drivers based upon the 2001 national census for Cheadle.

2.5.1 Future Development Trip Distribution

A second piece of information used to derive the predicted future trips distribution was also supplied by SMDC. The data was used to calculate the journey to work distribution and route assignment of Cheadle residences by car onto the network. The data was based on a residential development consisting of 400 dwellings. Similarly trip rates for these houses were assigned onto the network based upon 2001 census for journey to work postcodes.

Census data provides information regarding vehicular trip generation and origins/destinations between wards/parishes, and wider areas. However it is difficult to ascertain trends over time since in 2011 trips originating in Cheadle were included within the wider Staffordshire Moorlands trip origin figures, whereas in 2001 they were not. However it can be seen that in 2001 a percentage of 42.1% compares to a percentage of 30.1% in 2011 – a drop of 10% was observed.

The percentage decrease may be attributed to factors like recession and the increase in petrol prices. East Staffordshire trips decrease from 10.5% to 1.2%, Stafford from 7.7% to 1.3% and Stoke from 22.9% to 10.1%. Trips from Newcastle under Lyme remain broadly constant from 3.9% to 2.3% as a comparison. West Midlands, as a whole, in 2011, accounts for 45.8% of inbound trips to the Staffordshire Moorland Area.

The supplied SMDC predicted future development shows that of the total of 3421 inbound and outbound county trips in Staffordshire, the origin and destination of 866 trips (25.3%) were from Cheadle. Traffic trips in the model have been proportionally distributed based on the same methodology as the data supplied by SMDC across the Cheadle highway network.

3 Survey Results

3.1 Comparison of Results

The comparative results from the data collected during the December 2014 - January 2015 period and the additional results from March / April 2015 are shown in Tables 3-1 and 3-2.

A comparison of traffic survey results between December 2014 and April 2015 are presented in Tables 3-1 and 3-2. The tables highlight the traffic volume difference of the inbound traffic into Cheadle town centre between the two survey months. The April 2015 traffic surveys generally show a higher volume of traffic at the critical inbound links and therefore were used to update the traffic model to reflect the increase. Where there was a decrease in the April 2015 traffic data, December 2014 traffic data would be used to form a more robust traffic dataset. The traffic figures utilised for the comparison for each site (with respective inbound link) are highlighted in Table 3-1 in the yellow cells.

In Table 3-1 the AM Peak average flow volume data for a 5-day period has been compared. The results show that the most heavily trafficked routes within Cheadle include the A522 Leek Road, A522 Tean Road and A521 Town End junction. Furthermore, the traffic flows at each of these sites was more than double that on all other routes for the observed flows.

During the PM Peak period flow volume data for a 5-day period again showed that the most heavily trafficked roads were the A522 Leek Road, A522 Tean Road and the A521 Town End Road.

The results also suggest that in general, flow values for the March / April 2015 period are higher than those collected during the preceding December-January period. The most marked flow variations between the two datasets during the AM Peak period include the B5417 Queen Street where an increased flow difference of 129 vehicles was observed over the average 5-day period. Similarly, the Well Street link also showed noteworthy increases of 65 vehicles during the AM Peak. Other routes showed only negligible flow variances between the two datasets such as the A522 Tean Road and Glebe Road which showed only 22 and 5 vehicle increases respectively during the AM Peak. Conversely, several links showed flow decreases between the two datasets such as the A522 Leek Road and The Birches where flow decreases of 41 and 67 were observed during the AM Peak.

During the PM peak period the most marked flow variations between the two datasets were recorded on Well Street with flow differences of 266 vehicles for the 5-day average and the B5417 with 169 vehicle 5-day average increase. Several roads including the Birches, Glebe Road and Park Lane showed negligible flow decreases for the 5 and 7-day averages between the two datasets with the biggest difference of -37 vehicles recorded on the Birches.

Time Period AM Peak (08:00 – 09:00)			16th Dec 2014 – 22nd Dec 2014		5th Jan 2015 – 11th Jan 2015		27th Mar 2015 – 2nd April 2015 *NB		23rd May 2015 – 28th May 2015		Traffic Flow Comparison Dec 2014 – April 2015	
											Flow Difference (Actual)	
Site	ATC Count Location	Direction	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	**5-Day Average**	**7-Day Average**
1	A522 Leek Road	Northbound	401	328	393	324	439	366	325	285	**-41**	**-24**
		Southbound	614	497	594	482	573	473	387	347		
		2-Way Flow	1015	825	987	806	1012	839	712	632		
2	B5417 Queen Street	Eastbound	162	143	154	113	205	185	203	194	**129**	**99**
		Westbound	119	106	235	163	248	205	127	117		
		2-Way Flow	281	249	390	276	453	390	330	331		
3	Well Street	Eastbound	14	11	19	15	187	158	140	123	**65**	**59**
		Westbound	67	53	65	55	132	111	113	99		
		2-Way Flow	81	63	83	70	318	269	253	221		
4	B5032 Ashbourne Road	Eastbound	194	164	198	168	238	210	190	175	**53**	**46**
		Westbound	157	131	159	134	210	177	152	139		
		2-Way Flow	351	295	357	302	449	387	342	314		
5	A522 Tean Road	Northbound	460	381	477	347	482	399	303	270	**22**	**19**
		Southbound	395	317	426	305	434	349	171	162		
		2-Way Flow	856	698	903	652	916	748	474	432		
6	Charles Street (One Way)	Southbound (Only)	23	17	117	92	112	82	34	26	**88**	**65**
7	The Birches	Northbound	245	184	201	148	178	131	Inaccurate and Missing data recorded due to vehicle parking on the tube.		**-67**	**-53**
		Southbound	106	78	77	57	65	48				
		2-Way Flow	351	262	279	205	244	179				
8	Glebe Road	Eastbound	123	100	131	103	128	102	64	56	**5**	**2**
		Westbound	74	60	73	56	71	56	34	31		
		2-Way Flow	197	160	204	159	199	158	97	87		
9	A521 Town End	Eastbound	411	338	440	372	496	419	360	330	**85**	**81**
		Westbound	429	353	435	375	439	360	319	278		
		2-Way Flow	840	692	875	747	935	779	679	608		
10	Park Lane	Northbound	24	20	12	9	9	9	7	8	**-21**	**-16**
		Southbound	37	29	22	17	16	13	13	13		
		2-Way Flow	62	49	34	27	25	22	20	20		

Table 3-1: Table of AM Peak traffic flow comparison

***NB Surveys from the second week have not been included due to incomplete datasets as mentioned in Section 2.4**

Values representing inbound flows into Cheadle Town Centre

Time Period PM Peak (17:00 – 18:00)			16th Dec 2014 – 22nd Dec 2014		5th Jan 2015 – 11th Jan 2015		27th Mar 2015 – 2nd April 2015 *NB April 2015		23rd May 2015 – 28th May 2015		Traffic Flow Comparison Dec 2014 – April 2015	
											Flow Difference (Actual)	
Site	ATC Count Location	Direction	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	5-Day Av'rage	7-Day Av'rage	**5-Day Average**	**7-Day Average**
1	A522 Leek Road	Northbound	600	517	588	508	683	607	516	481	**27**	**18**
		Southbound	598	529	568	498	625	547	478	437		
		2-Way Flow	1198	1046	1156	1106	1308	1154	995	918		
2	B5417 Queen Street	Eastbound	252	229	218	189	246	225	227	212	**169**	**172**
		Westbound	144	129	160	128	313	302	271	264		
		2-Way Flow	396	358	378	317	559	527	498	476		
3	Well Street	Eastbound	14	11	30	23	278	234	230	202	**266**	**222**
		Westbound	77	61	160	130	343	283	255	255		
		2-Way Flow	91	72	189	153	621	517	484	427		
4	B5032 Ashbourne Road	Eastbound	234	200	271	233	296	256	220	200	**104**	**109**
		Westbound	208	178	253	216	312	286	213	200		
		2-Way Flow	442	378	524	449	608	543	432	400		
5	A522 Tean Road	Northbound	438	390	428	377	467	421	371	343	**29**	**31**
		Southbound	524	464	492	429	552	485	447	412		
		2-Way Flow	962	854	920	806	1019	906	818	755		
6	Charles Street (One Way)	Southbound (Only)	10	8	63	57	61	48	37	32	**52**	**40**
7	The Birches	Northbound	121	100	85	65	84	68	Inaccurate and Missing data recorded due to vehicle parking on the tube.		**-37**	**-32**
		Southbound	52	45	35	30	33	27				
		2-Way Flow	174	145	120	96	117	95				
8	Glebe Road	Eastbound	104	91	112	95	87	74	68	62	**-17**	**-17**
		Westbound	133	114	138	116	121	105	88	79		
		2-Way Flow	237	205	250	211	209	179	156	141		
9	A521 Town End	Eastbound	516	447	511	463	567	488	470	426	**51**	**41**
		Westbound	409	368	398	370	521	471	409	382		
		2-Way Flow	924	815	909	833	1088	959	879	807		
10	Park Lane	Northbound	28	27	16	13	11	11	12	11	**-14**	**-11**
		Southbound	25	21	12	12	11	11	11	11		
		2-Way Flow	54	49	28	25	22	22	23	22		

Table 3-2: Table of PM Peak traffic flow comparison

***NB Surveys from the second week have not been included due to incomplete datasets as mentioned in Section 2.4**

Values representing inbound flows into Cheadle Town Centre

4 Modelling

4.1 Introduction

As part of the Local Development Framework (LDF), additional housing and employment land must be provided /allocated for construction by 2026 across Cheadle. Based on the explanation set out in Section 2.5 above (and bearing in mind that this effectively over-estimates the amount of employment land provision actually needed),The following chapter sets out the scenarios which were assessed with the comparative results of the existing and (existing) worst case scenarios.

4.2 Sensitivity Test

As a sensitivity test, the Trip End Model Presentation Program (TEMPro) version 6.2 has been used to obtain a growth forecast for Cheadle. Table 4-1 displays the forecast growth for Cheadle in increments of five years from the year 2015 to 2035.

	Year		Weekday Morning Peak Period			
	From	To	Origin	Destination	Average	Percentage Growth
AM	2015	2020	1.03	1.03	1.03	**3.3**
	2015	2025	1.07	1.07	1.07	**6.8**
	2015	2030	1.10	1.10	1.10	**10.1**
	2015	2035	1.12	1.13	1.13	**12.9**
PM	2015	2020	1.03	1.03	1.03	**3.4**
	2015	2025	1.07	1.07	1.07	**7.0**
	2015	2030	1.11	1.10	1.10	**10.4**
	2015	2035	1.14	1.13	1.13	**13.4**

Table 4-1 TEMPro Table Results

The base 2015 network traffic volume with the addition of SMDC predicted future development (as mapped in Appendix D1.0), assessed within the microsimulation model is 2697 for the AM period. The base year traffic volume with the addition of SMDC predicted future development equates to 10.1% growth in vehicles (see Table 4-2). The 10.1% growth corresponds with forecast TEMPro growth rates for 2030. This indicates that the 2015 AM base VISSIM model traffic, with the addition of the predicted future development traffic is equivalent to approximately 15 years of TEMPro Forecast growth.

For the PM period, the base 2015 VISSIM model volume with the addition of predicted future development coincides with the projected TEMPro growth rate up to the year 2025. The PM 2015 base traffic flow with the addition of the SMDC predicted future development equates to an 8.1% growth in vehicles, which is comparable to the 7% growth predicted by TEMPro (see Table 4-2). The model is therefore equivalent to approximately 10 years of TEMPro forecast growth. It should be noted that the network traffic volume for each respective year and per period have been derived by analysing the TEMPro Growth shown in Table 4.1

	Year	Network Traffic Volume	Predicted future Development	Total	Percentage (%)
AM	**2015 Base**	2449			
	Worst Case Scenario	2449	246	2697	10.10%
	2020	2529		2529	
	2025	2616		2616	
	2030	2697		2697	
	2035	2766		2766	
PM	**2015 Base**	2878			
	Worst Case Scenario	2878	232	3110	8.10%
	2020	2976		2976	
	2025	3080		3080	
	2030	3178		3178	
	2035	3263		3263	

Table 4-2 TEMPro AM/PM Table Results

4.3 Existing Base Year Model

The observed turning movements and link flows were used to validate the traffic volumes for the AM and PM Peak base models under demand conditions. A 15 minute 'build up' period was included in order to allow traffic to load the network, thereby giving a more representative set of validation results.

4.3.1 Model Calibration

The purpose of model calibration is to ensure that the model assignments are appropriate and representative. Calibration is an iterative process in which the model is continually revised to ensure that:

- Traffic patterns throughout the study area are modelled accurately, including vehicle route choices,
- Junctions within the network are modelled accurately in terms of vehicle behaviour, especially at stop lines and lane changing, and
- Traffic volumes on the roads are modelled accurately.

4.3.2 Model Validation

The Design Manual for Roads and Bridges (DMRB) specifies acceptable values for modelled and observed flow comparisons and suggests how this validation should relate to the magnitude of the values being compared.

The percentage differences between observed and modelled data sets can prove to be misleading given the relative value of the difference. Hence, the standard method used to compare modelled values against observations on a link, involves the calculation of the Geoff Havers (GEH) statistic; a form of the Chi-squared statistic, incorporating both relative and absolute errors.

The GEH statistic is a measure of comparability that takes account of not only the difference between the observed and modelled flows, but also the significance of this difference with respect to the size of the observed flow. For instance, a difference of 50% compared to an observed flow of 10 is of far less significance than a difference of 20% compared with an observed flow of 1000. The GEH is calculated as follows:

$$GEH = \sqrt{\frac{(M-C)^2}{\frac{1}{2}(M+C)}}$$

Where C is the observed flow and M is the modelled flow. The criteria in comparing assigned volumes with observed volumes a GEH parameter of 5 or less indicates an acceptable fit whilst a value greater than 10 requires closer attention.

The best measure of the overall performance of the model is to consider particular journey times through the assigned network and compare the known observed travel times with those predicted by the model. This combines the delays which are simulated at each junction along the route and therefore presents a good indication of the overall correspondence between known and replicated movements.

The criteria and measures guidance set out in the DMRB are summarised in Figure 4-1.

Criteria and Measures	Acceptability Guideline
Assigned Hourly flows * compared with observed flows	
1. Individual flows within 15% for flows 700 - 2,700 vph	)
2. Individual flows within 100 vph for flows < 700 vph	) > 85% of cases
3. Individual flows within 400 vph for flows > 2,700 vph	)
4. Total screenline flows (normally > 5 links) to be within 5%	All (or nearly all) screenlines
5. GEH statistic: i) individual flows : GEH < 5	> 85% of cases
ii) screenline (+) totals: GEH < 4	All (or nearly all) screenlines
Notes + Screenlines containing high flow routes such as Motorways should be presented both including and excluding such routes * links or turning movements (but see Paragraph 4.4.37).	
Modelled journey times compared with observed times	
6. Times within 15% (or 1 minute, if higher)	> 85% of routes

Figure 4-1 Model Validation Criteria

4.3.3 Overall Turning Count Validation

A total of 16 junctions were analysed, Table 4-3 presents a summary of the overall turning count validation at all the junctions.

Junction	AM Peak Hour (0800 – 0900)				PM Peak Hour (1700 – 1800)			
	Observed Flows	Modelled Flows	% Diff	GEH	Observed Flows	Modelled Flows	% Diff	GEH
A522 Leek Rd / A522 Tape St / A521 High St	1175	1203	2	0.8	1392	1291	-7	2.8
A522 Tape St / B5417 Queen St	1279	1250	-2	0.8	1402	1367	-3	0.9
A522 Tape St / Well St / A521 Chapel St	1600	1629	2	0.7	2018	2056	2	0.8
A522 Tape St / B5032 Ashbourne Rd	1356	1285	-5	2.0	1522	1602	5	2.0
A522 Tape St / Mill Rd / A522 Tean Rd / Charles St	1112	1037	-7	2.3	1164	1194	3	0.9
A521 Chapel St / Charles St	874	852	-3	0.7	903	925	2	0.7
Cross St / A521 Chapel St	947	919	-3	0.9	979	959	2	0.6
A521 Bank St / Oak St	605	603	0	0.1	603	637	6	1.4
A521 Bank St / Lid Ln	602	607	1	0.2	601	637	6	1.4
Bank St / Watt Place	663	695	5	1.2	626	730	17	4.0
A521 The Terrace / A521 High St / Watt Place	753	829	10	2.7	711	793	12	3.0
A521 High St / Oak St	703	744	6	1.5	692	753	9	2.3
A521 High St / Cross St	729	747	2	0.7	825	755	-8	2.5
Lid Ln / Royal Walk / Watt Place	322	355	10	1.8	159	188	18	2.2
Lid Ln / The Birches	242	255	5	0.8	122	157	29	3.0
A521 Town End / Glebe Rd	1063	1099	3	1.1	1148	1253	9	3.0

Table 4-3: Summary of AM and PM Peak Hour Turning Movements Validation.

The junction turning movement validation results have achieved GEH values below five, therefore it meets the DMRB guidance.

4.3.4 Link Flow Validation

In addition to the turning movement validations, link flow validations have been undertaken on the critical inbound and outbound (origin / destination) links. For these links the model calibration and validation meets the DMRB requirements with only required 85% links with GEH value less than 5.

Tables 4-4, presents a summary of the link flow validation for both AM and PM Peak hours.

Links	A.M. Peak Hour				P.M. Peak Hour			
	Observed Flows	Modelled Flows	% Diff	GEH	Observed Flows	Modelled Flows	% Diff	GEH
A522 Leek Road (Inbound)	529	558	5	1.2	561	564	1	0.1
A522 Leek Road (Outbound)	505	491	-3	0.6	654	556	-15	4.0
B5417 Queen Street (Inbound)	119	142	+19	2.0	144	164	14	1.6
B5417 Queen Street (Outbound)	162	167	3	0.4	252	202	-20	3.3
B5032 Ashbourne Road (Inbound)	157	170	13	1.0	208	282	36	4.7
B5032 Ashbourne Road (Outbound)	194	236	22	2.9	234	314	34	4.8
A522 Tean Road (Inbound)	460	498	8	1.7	438	493	13	2.5
A522 Tean Road (Outbound)	395	364	-8	1.6	524	549	5	1.1
The Birches (Inbound)	245	169	-31	5.3	121	121	0	0
The Birches (Outbound)	106	77	-27	3.0	52	29	-44	3.6
Glebe Road (Inbound)	123	126	2	0.3	104	104	0	0
Glebe Road (Outbound)	74	64	-14	1.2	133	166	25	2.7
A521 Town End (Inbound)	411	450	9	1.9	516	531	3	0.7
A521 Town End (Outbound)	428	457	7	1.4	409	443	8	1.6

Table 4-4: Summary of AM and PM Peak Hour Link Flows Validation.

4.3.5 Journey Time Validation

The 2015 AM / PM models were validated to observed journey times for four routes across the study area.

DMRB guidelines state that modelled journey times should be within 15% of observed times if under one minute, or within one minute if the duration of the journey exceeds one minute. Table 4-5 presents the model output compared to observed journey times for the four routes.

PEAK	Route	Average Observed Journey Time (sec)	Modelled Journey Time (sec)	Diff (sec)	% Diff	Within 15% or 1 minute if higher
AM	1	172	151	21	12	Y
	2	208	167	41	20	Y
	3	152	118	34	22	Y
	4	128	97	31	24	Y
PM	1	164	160	4	3	Y
	2	197	171	26	13	Y
	3	164	127	37	23	Y
	4	131	96	35	27	Y

Table 4-5: AM/PM Peak Model Journey Time Validation.

The overall journey time validations between the modelled and observed on the four routes have achieved the acceptability guideline set out in the DMRB. Therefore the 2015 AM / PM provides a robust platform for the forecast assessment and scheme appraisal.

5 Modelling Worst Case Scenarios

As referenced in Tables 3.1 and 3.2 previously, traffic data captured during the December 2014, January 2015, March / April 2015 and May 2015 collection periods have been analysed. From these datasets, the highest flow values for each respective link have been collated as a 'Worst Case' assessment which includes Alton Towers Trips. This data was then inputted into VISSIM for modelling purposes. It is considered the resultant dataset will provide a robust platform upon which to undertake subsequent assessments.

Modelled results for flow, queues and journey times have been recorded for each of the following scenarios:

- 2015 AM / PM Worst Case Base, and
- 2026 AM / PM Worst Case (2015 Worst Case Base + 2026 predicted future Development).

The scenarios modelled have attempted to establish the effect the cumulative programme of predicted future development for Cheadle under the LDF up to the year 2026 will have on the network's performance.

5.1 Worst case model results comparison

The following assessments provide a comparison between the '2015 AM / PM Worst Case Base' and '2026 AM / PM Worst Case (2015 Worst Case Base + 2026 predicted future Development)' traffic flows and queue lengths for the highest flow value combined dataset. The findings are presented in the following paragraphs.

5.1.1 Traffic Flows - AM Peak

Examination of traffic flows during the AM Peak reveals that volume increases following development are quite significant along a number of links through Cheadle. Of particular note is the A521 Town End (EB) where an increase from 519 to 700 is observed (a 181 vehicle increase). Similar increases were observed at The Terrace (EB) and A521 High Street where increases of 176 and 177 vehicles respectively were observed. The remaining routes showed lesser increases with many only exhibiting negligible differences. Despite these increases, the modelled flows suggest that the network generally operates within capacity. The AM peak summary table can be seen in Appendix E1.0.

5.1.2 Traffic Flows - PM Peak

A similar analysis of PM Peak flows shows that the same links as listed above show the highest flow increases post development. The A521 Town End (EB) and A521 High Street both show a 160 vehicle increase, whilst The Terrace (EB) shows a 157 vehicle increase. Several routes however show a decrease in flows post development such as the B5417 Queen Street where a decrease of 58 vehicles was observed and A522 Tape Street (SB) where a 69 vehicle decrease occurred. These decreases are as a result of the extra post development traffic causing large queues. The extra post development traffic assigned onto the network during the PM Peak hour joins the already existing queue on the Tape Street southbound approach arm at the Tape Street/Chapel Street/Well Street roundabout.

The resulting queue cannot be accommodated on Tape Street and so blocks back further up Leek Road southbound and the B5417 Queen Street westbound as illustrated in Figure 5-2 and discussed in the section below. As a result, fewer vehicles are able to reach their destination during the PM Peak hour and as such causes a reduction in traffic flows on Tape Street South and B5417 Queen Street Westbound. The PM Peak summary table can be seen in Appendix E1.0.

5.1.3 Queue Lengths - AM Peak

The effects of predicted future development show some noteworthy effects on queue lengths along a number of links within the town centre during the AM Peak. Of particular note are flows along A522 Tape Street (N), which post development are forecast to increase average queue lengths during the AM Peak from 108 metres to 199 metres (an increase of 91 metres).

Assuming an average length of 6 metres Per Car Unit (PCU), the increase of 91m following development equates to an approximate queue increase of 15 vehicles. Other noteworthy queue increases include the A521 'The Terrace' arm where the 70 metre increase from 0 metres to 70 metres equates to approximately 12 vehicles. The majority of key links and arms within the town centre show only negligible variances resulting from the effects of development and as such have no detrimental impact on queuing and congestion within Cheadle.

Conversely, several links and arms exhibit a marked decrease in queuing following development. Of note is the A522 Tape Street (S) which exhibits a decrease in modelled queueing from 116 metres to 52 metres (11 vehicle reduction). This might be attributable to the redistribution of traffic flows along principal routes following the completion of development. Other queue decreases are observed along the A522 Tape Street (S) and A521 Town End (EB) with queue decreases of 4 and 3 vehicles respectively. An illustration of the peak queue increase for the AM Peak period is shown in Figure 5-1.

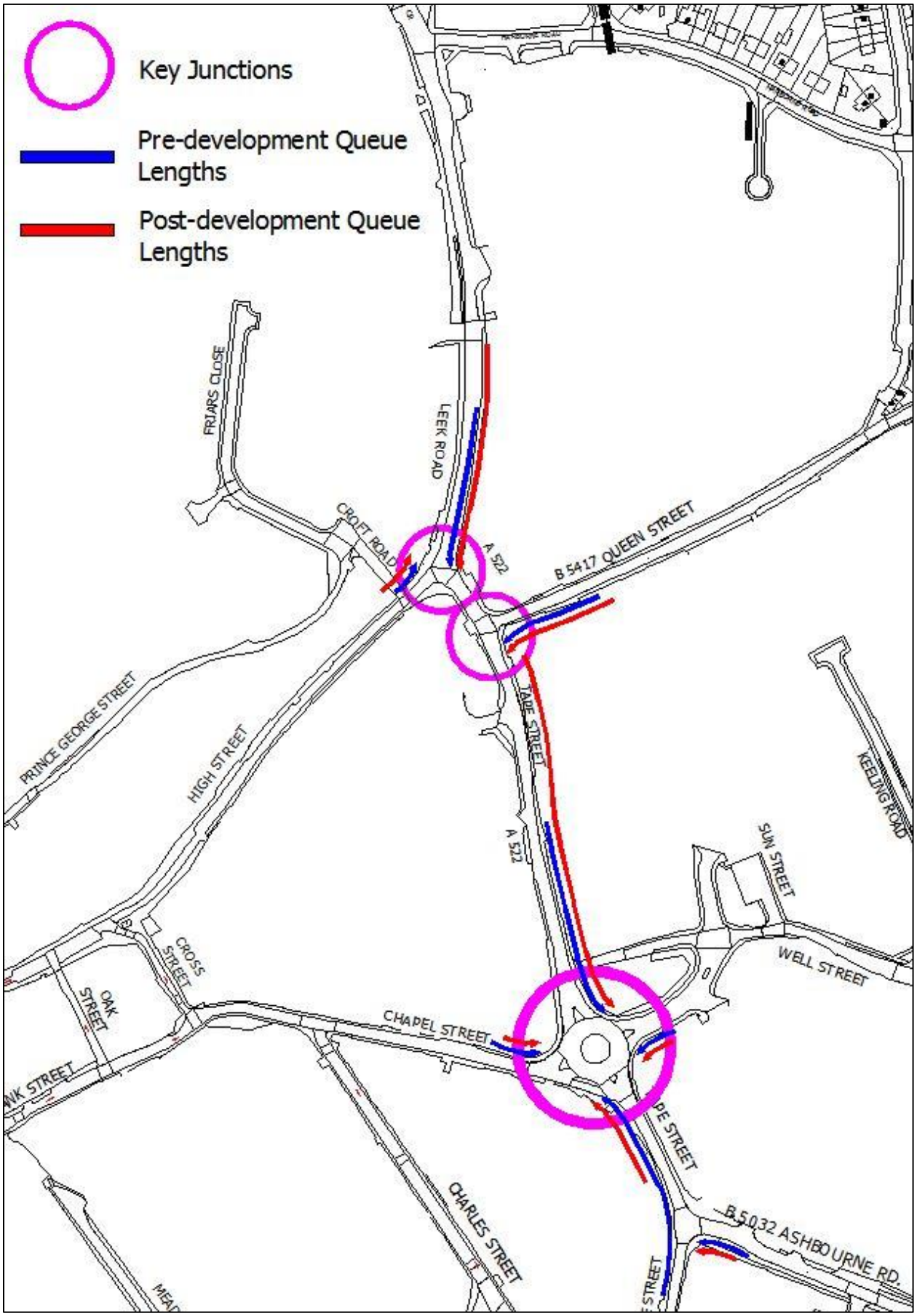


Figure 5-1 AM Peak Average Queue Length Increases

5.1.4 Queue Lengths - PM Peak

The PM Peak results show some significant queuing increases post development. Although Tape Street (N) shows no net increase with development trips (exhibiting 48metre queue lengths in both models) this is because 48metres is the length of the actual link. As such, this queue is extended further up the network, as discussed in section 4.5.2, to cause a significant increase in queues on the B5417 Queen Street westbound.

Queues, on the B5417 Queen Street westbound, increase from a queue of 257 metres (without development) to 356 metres (17 vehicles). This is corroborated by the findings of the traffic flows already mentioned which reveal lower flows discharging through the network along both Queen Street and Tape Street. All other links only exhibit negligible variances or decreases in queuing which again might be attributable to a reduced ability to discharge flows. An illustration of the peak queue increase for the PM Peak period is shown in Figure 5-2.

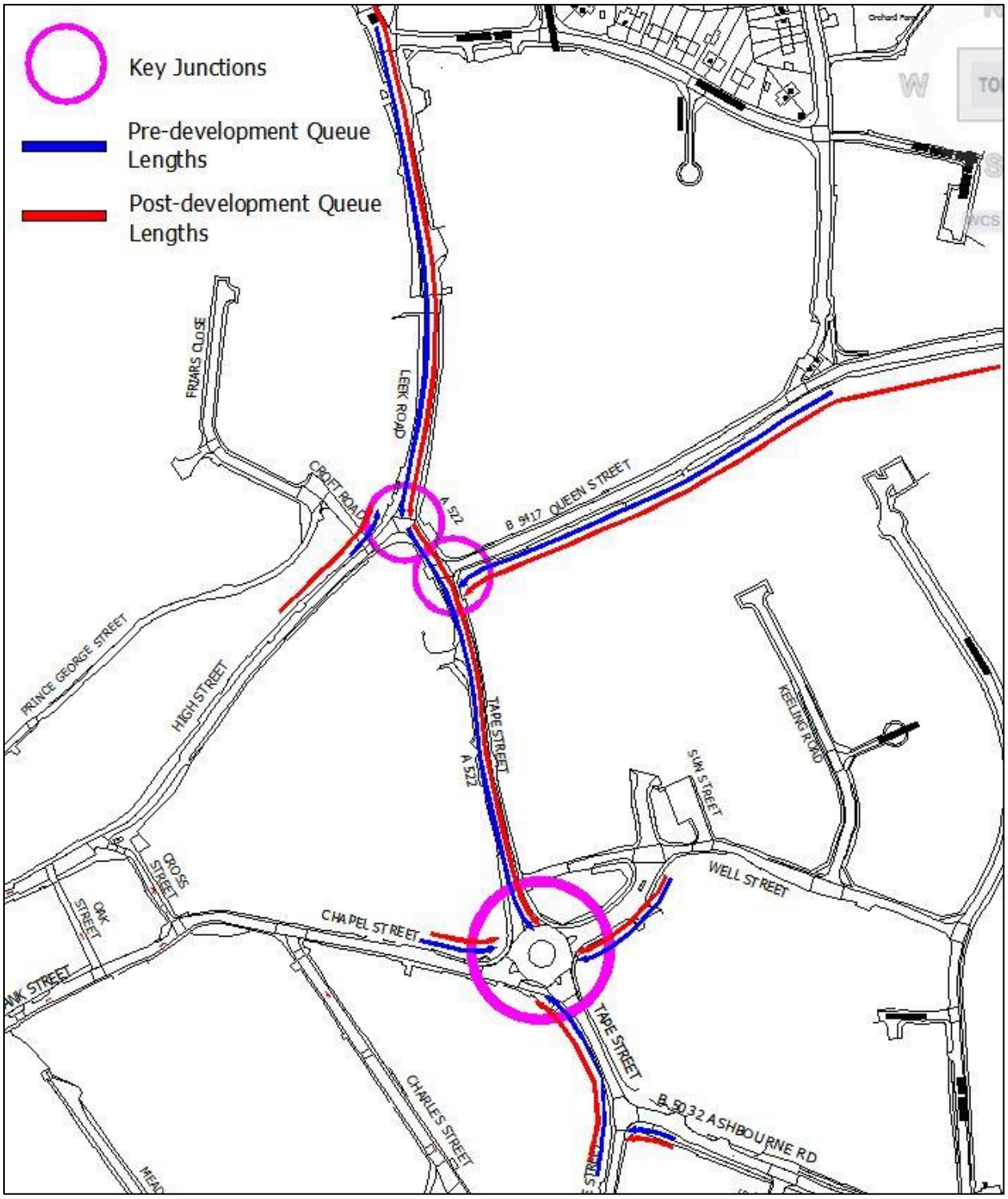


Figure 5-2 PM Peak Average Queue Length Increases

5.2 Journey Times and Delay Times

The network performance in terms of journey times and delay times was assessed in both the AM and PM Peak period along a number of pre-determined routes through Cheadle. The routes which have been assessed, as previously described in Section 2.5, are listed as follows:

- Route 1 – A522 Tean Road to A521 Town End,
- Route 2 – B5417 Queen Street to Glebe Road,
- Route 3 – A521 Town End to B5032 Ashbourne Road, and
- Route 4 – A521 Town End to A522 Leek Road.

Average journey times (as measured in seconds) along each route have been recorded and modelled, for both '2015 AM / PM Worst Case Base' and '2026 AM / PM Worst Case (2015 Worst Case Base + Predicted future Development)' scenarios. The tabulated results of these surveys are shown in Table 5-1. Average delay times (also measured in seconds) along each route have also been recorded and modelled for both scenarios. The tabulated results of these surveys are shown in Table 5-2.

During the AM Peak, Route 1 shows no change between the two development scenarios, with average journey times and delay remaining unchanged for both. During the PM Peak, the route also shows limited variations, with -1 and 0 second delays in journey and delay times respectively. These results are not regarded as having any significance.

Route 2 shows wider differences in both journey time and delay during the AM Peak period, with 8 and 7 second increases respectively. During the PM Peak, the route exhibits even more difference with increases of 169 seconds in both journey time and delay. This increase can be attributed to the fact the route includes both B5417 Queen Street and A522 Tape Street(S) which, as previously discussed in Section 4.5.4 experience a large increase in queues with the extra predicted future development traffic.

Route 3 shows 6 second increases in both journey and delay during the AM Peak and 2 second increases in both during the PM Peak period.

Route 4 also shows variations in journey and delay during the AM Peak with 2 and 4 second increases in journey and delay respectively. During the PM Peak, the increases become more pronounced with 5 and 4 second increases in journey and delay respectively.

Route	Route Description	AM Peak (0800-0900)			PM Peak (1700-1800)		
		2015 AM Worst Case Base	2026 AM Worst Case (2015 Worst Case Base + Predicted future development)	Difference	2015 PM Worst Case Base	2026 PM Worst Case (2015 Worst Case Base + Predicted future development)	Difference
		Modelled Journey Time (Sec)			Modelled Journey Time (Sec)		
1	Tean Road to Town End	159	161	2	164	163	-1
2	Queen Street to Glebe Road	183	191	8	365	534	169
3	Town End to Ashbourne Road	122	128	6	135	137	2
4	Town End to Leek Road	98	100	2	98	103	5

Table 5-1: AM & PM Peak Period Journey Time Results including Alton Towers Derived Traffic

Route	Route Description	AM Peak (0800-0900)			PM Peak (1700-1800)		
		2015 AM Worst Case Base	2026 AM Worst Case (2015 Worst Case Base + Predicted future development)	Difference	2015 PM Worst Case Base	2026 PM Worst Case (2015 Worst Case Base + Predicted future development)	Difference
		Modelled Delay Time (Sec)			Modelled Delay Time (Sec)		
1	Tean Road to Town End	33	35	2	37	37	0
2	Queen Street to Glebe Road	40	47	7	221	390	169
3	Town End to Ashbourne Road	16	22	6	28	30	2
4	Town End to Leek Road	6	10	4	6	10	4

Table 5-2: AM & PM Peak Period Delay Time Results including Alton Towers Derived Traffic

6 Conclusions

This report outlines the work undertaken in association with the Cheadle Transport Study. The report highlights the existing road network's operational capacity and the effects of a programme of predicted future development on the operational performance of the road network within Cheadle. Combined data collected over December 2014, January 2015, March 2015, April 2015 (during half-term) and May 2015 (which incorporated traffic associated with the nearby Alton Towers Theme Park) have been used as the basis for assessment.

Traffic flows, vehicular queuing and journey time delays have been used as criteria to assess the network's performance during the AM and PM Peak periods for both '2015 AM/PM Worst Case Base' and '2026 AM/PM Worst Case (2015 Base Worst Case + Predicted future Development)' scenarios. The platform to assess the traffic data has been undertaken using the microsimulation modelling package VISSIM. From the analysis undertaken within the preceding sections of this report, the following conclusions are drawn:

- The AM Peak period post development showed slightly varied results concerning journey times, queues and traffic flow. The results therein are generally deemed negligible and the network within Cheadle remained operating within capacity. There was observed to be some remaining spare capacity to accommodate increased flows here.

- During the PM Peak conditions are more constrained, with numerous links already operating near or at capacity without added development flows. Such links include the A522 Leek Road (SB) and the A522 Tape Street (S). These routes currently show queueing which spans the entirety of each respective link length. These conditions are worsened in the post development scenario leading to further increased queuing on adjacent links such as B5417 Queen Street where queuing is forecast to increase by an average 17 vehicles following development. All of the examined routes also exhibit a flow decrease post development which suggests that the capability of the links to discharge flows effectively and efficiently is impaired. The major pinch point is at the A522 Tape Street /Chapel Street/Well Street southbound roundabout approach arm. The queues here back up Tape Street to cause large queues and excessive delays to the junctions of A522 Leek Road / A522 Tape Street Roundabout junction and the B5417 Queen Street / A522 Tape Street junction.
- The Post development traffic conditions have a profound negative impact on journey times on Route 2 (B5417 Queen Street to Glebe Road) which result in prolonged delays.

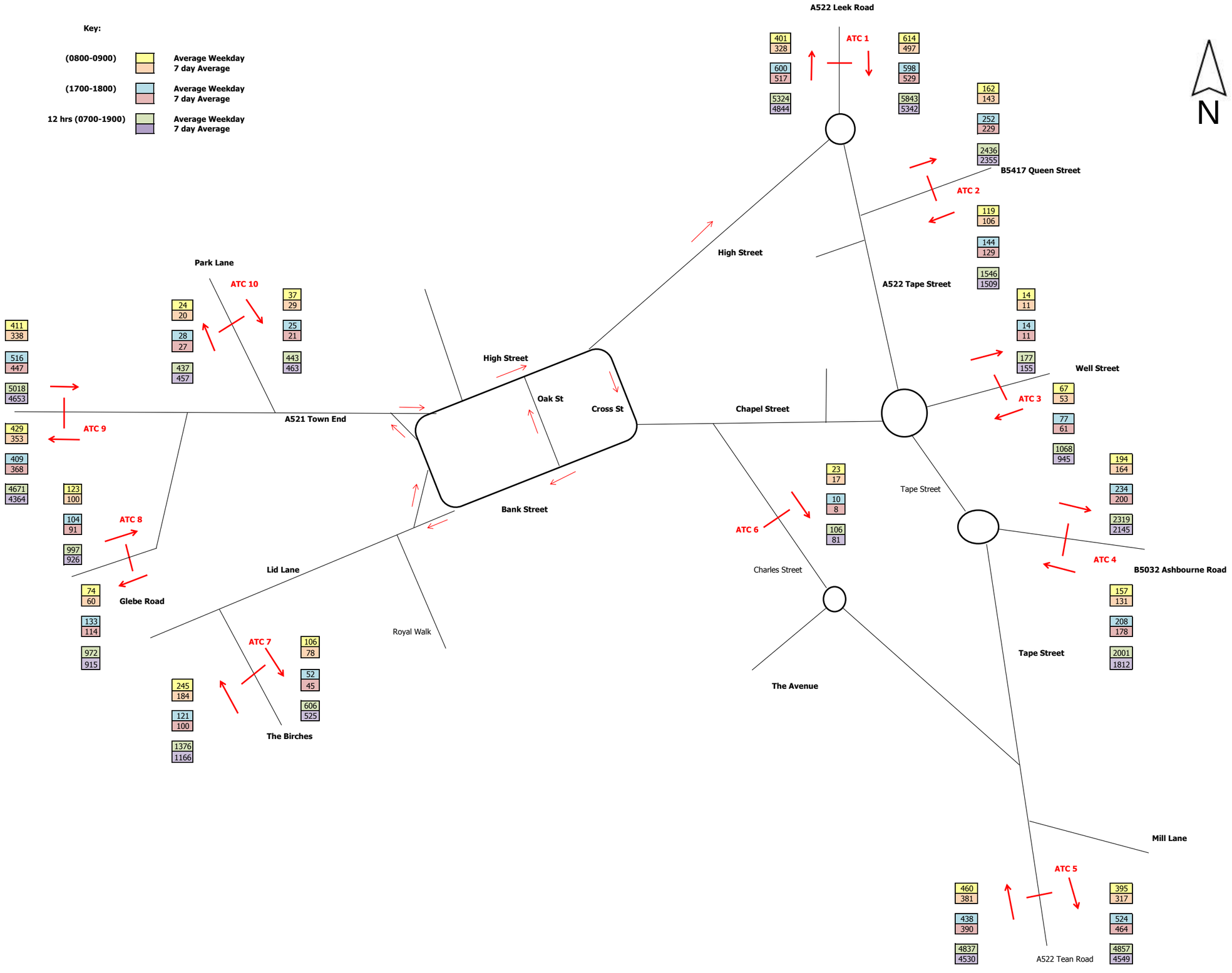
7 Recommendations

From assessing the Cheadle town centre operational capacities with the addition of the proposed Local Development Framework (LDF) predicted development trips, the following measures have been recommended:

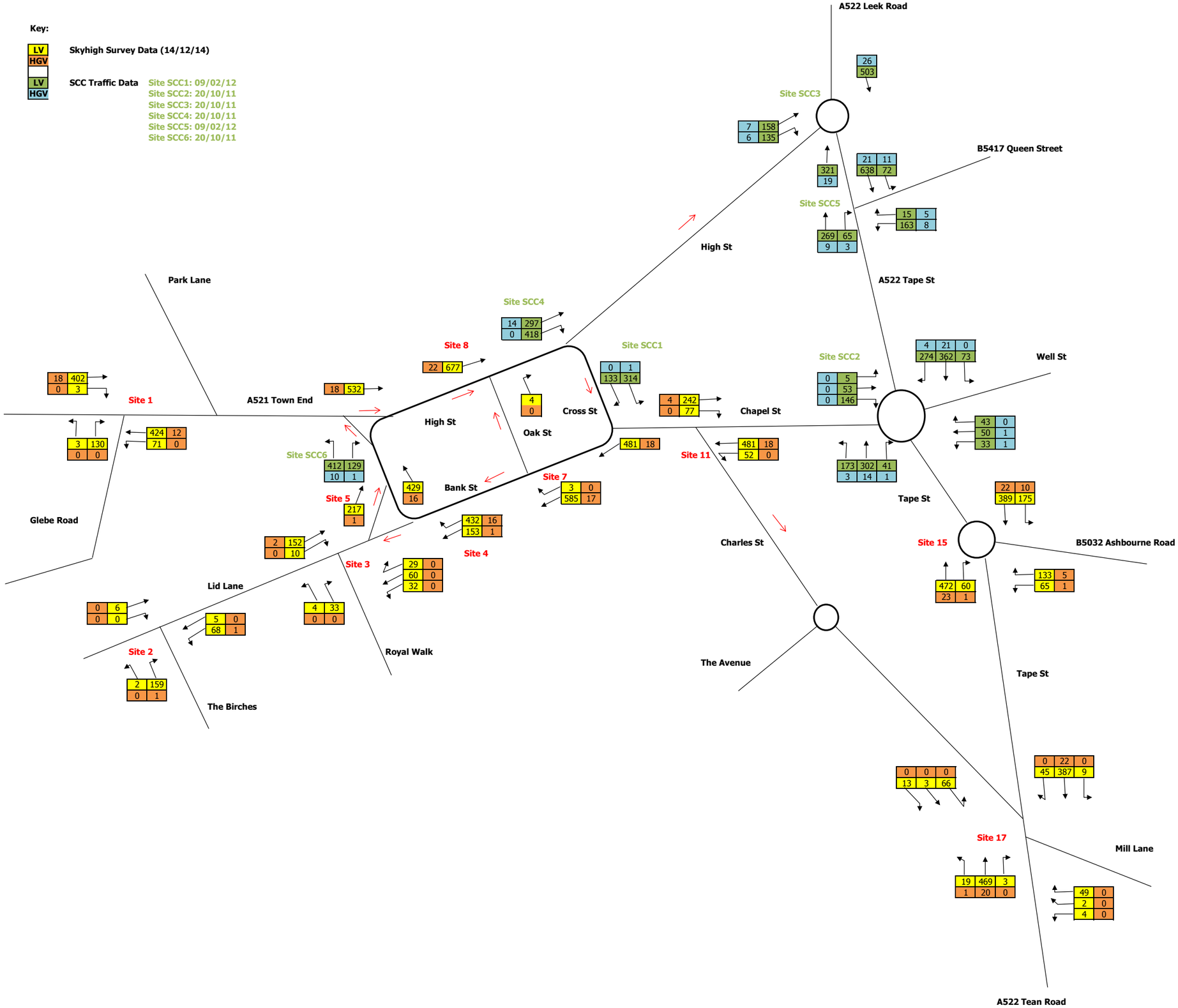
- Investigation into highway improvements on the existing network to mitigate future issues highlighted including the introduction of pinch point improvements to increase existing capacities at key junctions,
- Investigation into existing Traffic Regulation Order's (TRO) for the loading/unloading of HGV's along the High Street, and
- Revisions to the Cheadle Town Centre signing strategy. A strategy will need to be agreed to sign HGV's through / around Cheadle.

Appendix A1.0

Cheadle Town Centre Study - Automatic Traffic Count (ATC) - Survey Date: 15/12/2014 to 21/12/2014

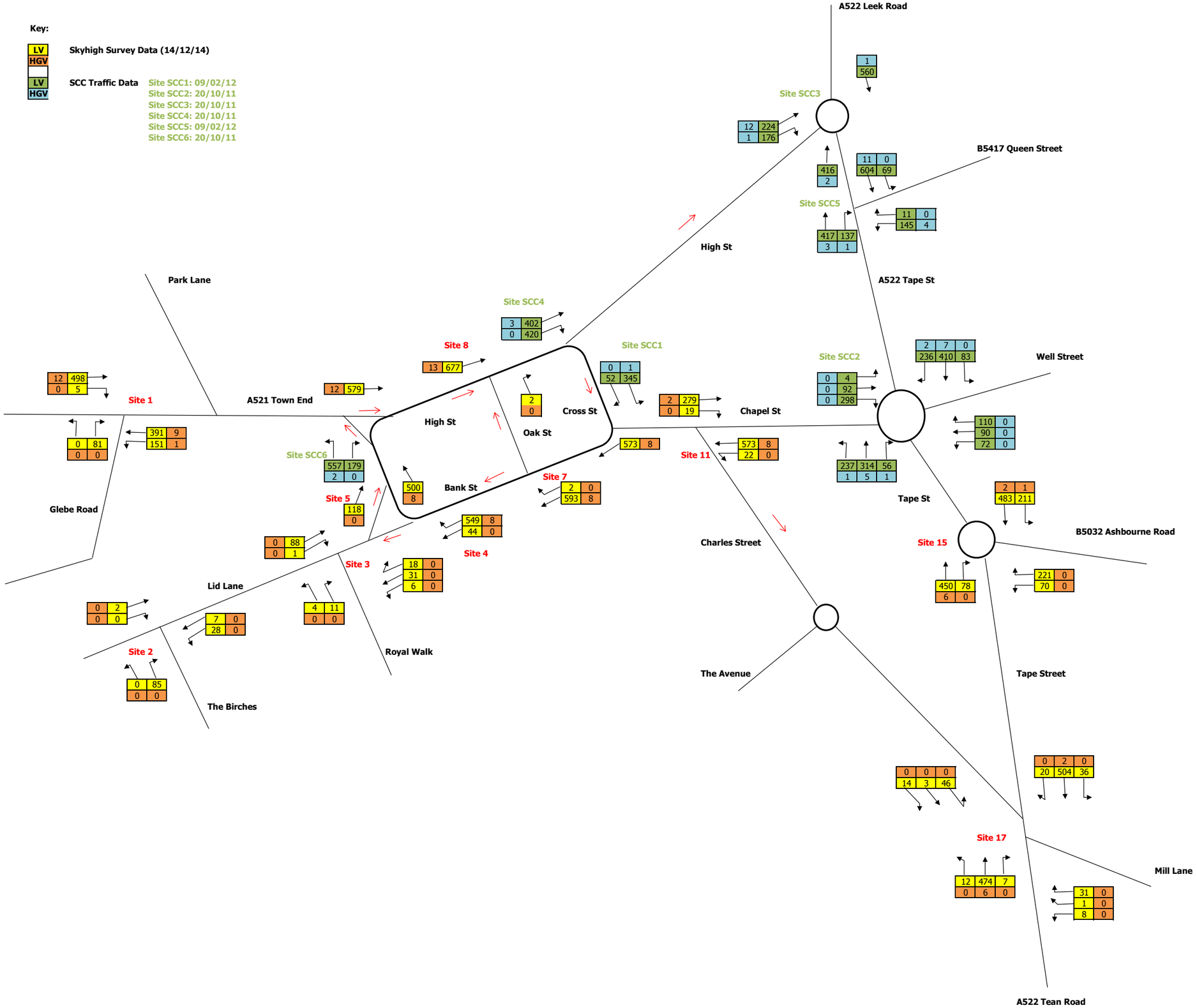

Key:
(0800-0900)
Average Weekday
7 day Average
(1700-1800)
Average Weekday
7 day Average
12 hrs (0700-1900)
Average Weekday
7 day Average
N
A522 Leek Road
ATC 1
401
328
600
517
5324
4844
614
497
598
529
5843
5342
B5417 Queen Street
ATC 2
162
143
252
229
2436
2355
119
106
144
129
1546
1509
A522 Tape Street
High Street
Park Lane
ATC 10
24
20
28
27
437
457
37
29
25
21
443
463
411
338
516
447
5018
4653
ATC 9
429
353
409
368
4671
4364
A521 Town End
High Street
Oak St
Cross St
Chapel Street
Well Street
14
11
14
11
177
155
ATC 3
67
53
77
61
1068
945
Tape Street
194
164
234
200
2319
2145
ATC 4
B5032 Ashbourne Road
157
131
208
178
2001
1812
Tape Street
123
100
104
91
997
926
ATC 8
74
60
Glebe Road
133
114
972
915
Lid Lane
Bank Street
ATC 6
23
17
10
8
106
81
Charles Street
The Avenue
Royal Walk
ATC 7
106
78
52
45
606
525
245
184
121
100
1376
1166
The Birches
Mill Lane
ATC 5
460
381
438
390
4837
4530
395
317
524
464
4857
4549
A522 Tean Road

Appendix A1.1 Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)



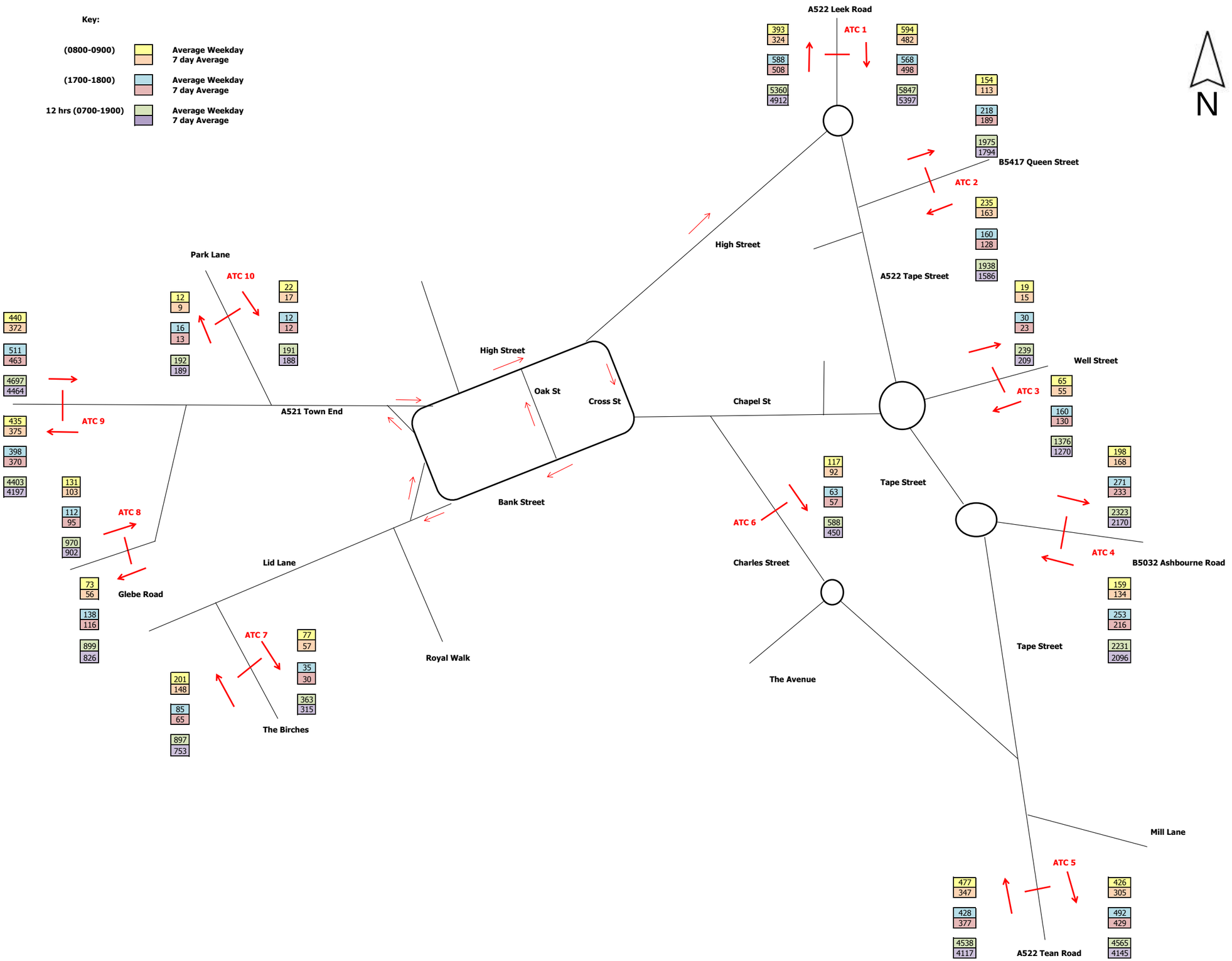
Appendix A1.1 May 2015 **COSTCDT6573**	**Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)**	amey

Appendix A1.2 Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)

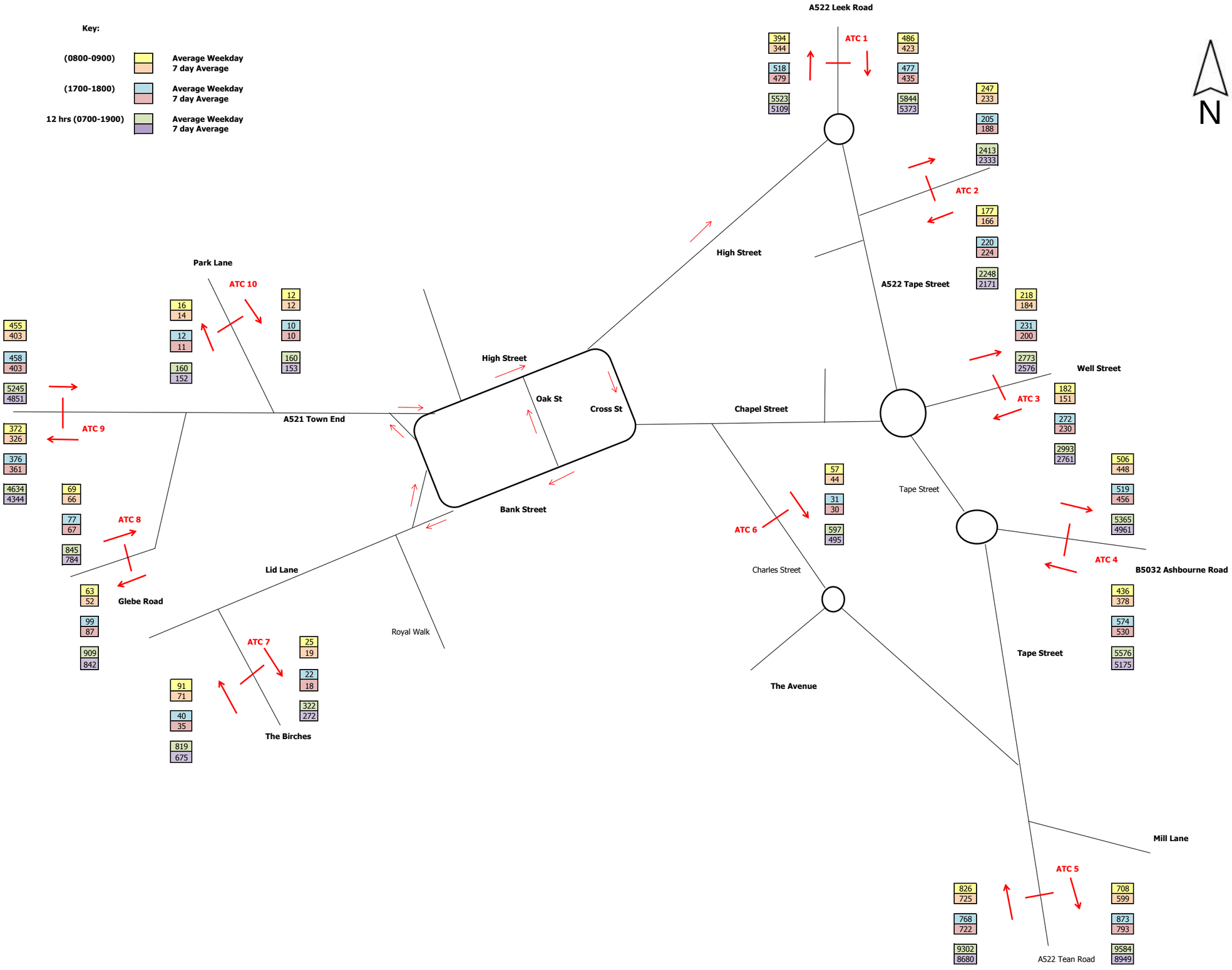


Appendix A1.2 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)	amey

Appendix B1.0 Cheadle Town Centre Study - Automatic Traffic Count (ATC) - Survey Date: 05/01/2015 to 11/01/2015

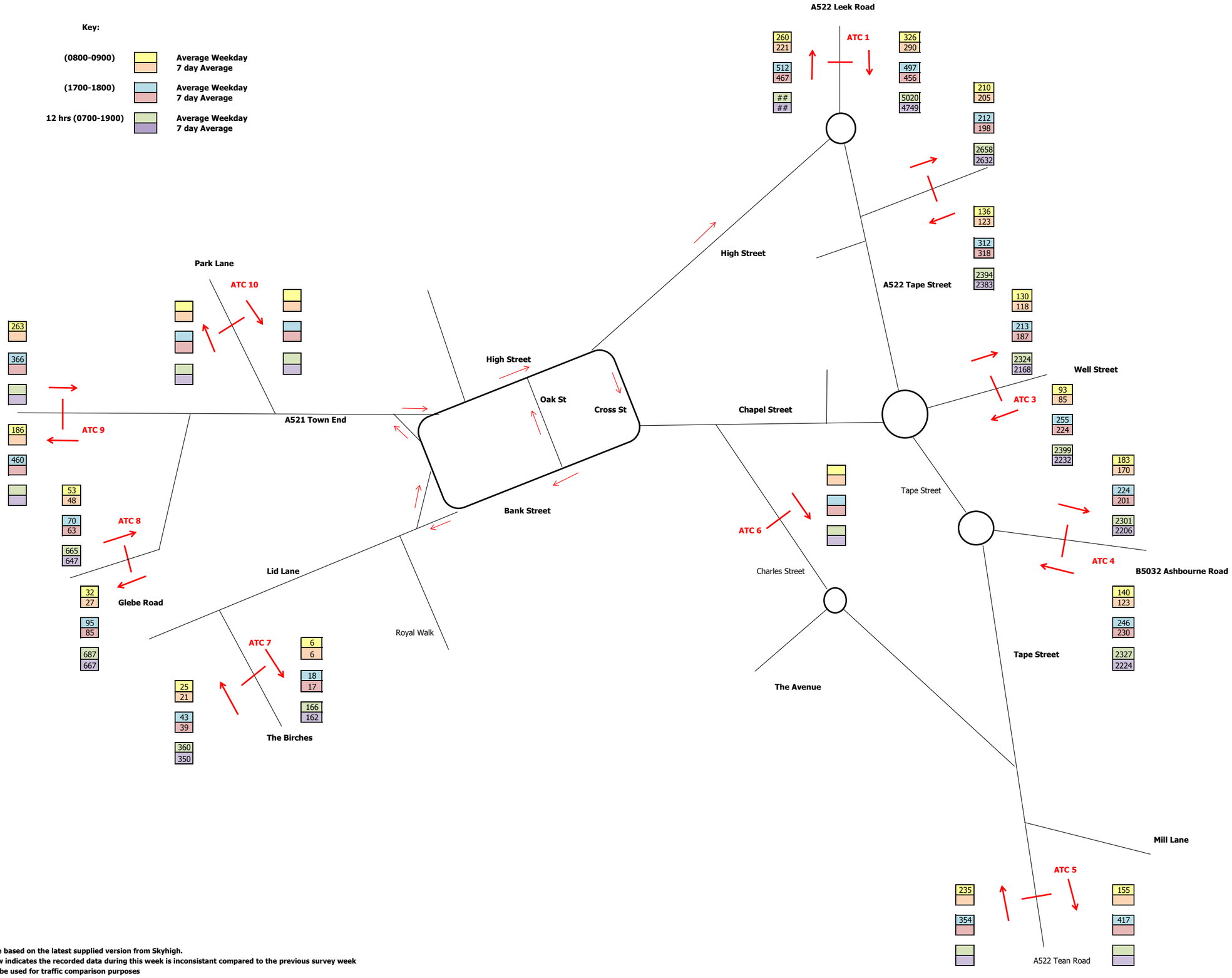

Key:
(0800-0900)
Average Weekday
7 day Average
(1700-1800)
Average Weekday
7 day Average
12 hrs (0700-1900)
Average Weekday
7 day Average
N
A522 Leek Road
ATC 1
393
324
588
508
5360
4912
594
482
568
498
5847
5397
B5417 Queen Street
ATC 2
154
113
218
189
1975
1794
235
163
160
128
1938
1586
A522 Tape Street
High Street
Park Lane
ATC 10
12
9
16
13
192
189
22
17
12
12
191
188
440
372
511
463
4697
4464
435
375
398
370
4403
4197
ATC 9
A521 Town End
High Street
Oak St
Cross St
Chapel St
Well Street
19
15
30
23
239
209
ATC 3
65
55
160
130
1376
1270
Tape Street
198
168
271
233
2323
2170
ATC 4
B5032 Ashbourne Road
159
134
253
216
2231
2096
Tape Street
117
92
63
57
588
450
ATC 6
Charles Street
The Avenue
Bank Street
Lid Lane
131
103
112
95
970
902
ATC 8
73
56
138
116
899
826
Glebe Road
ATC 7
77
57
35
30
363
315
201
148
85
65
897
753
The Birches
Royal Walk
Mill Lane
ATC 5
477
347
428
377
4538
4117
426
305
492
429
4565
4145
A522 Tean Road

Appendix C1.0 Cheadle Town Centre Study - Automatic Traffic Count (ATC) - Survey Date: 27/03/2015 to 02/04/2015


Key:
(0800-0900)
Average Weekday
7 day Average
(1700-1800)
Average Weekday
7 day Average
12 hrs (0700-1900)
Average Weekday
7 day Average
N
A522 Leek Road
ATC 1
394
344
518
479
5523
5109
486
423
477
435
5844
5373
247
233
205
188
2413
2333
ATC 2
177
166
220
224
2248
2171
High Street
A522 Tape Street
Park Lane
ATC 10
16
14
12
11
160
152
12
12
10
10
160
153
455
403
458
403
5245
4851
ATC 9
372
326
376
361
4634
4344
High Street
Oak St
Cross St
A521 Town End
Chapel Street
218
184
231
200
2773
2576
Well Street
ATC 3
182
151
272
230
2993
2761
506
448
519
456
5365
4961
ATC 4
B5032 Ashbourne Road
Tape Street
57
44
31
30
597
495
ATC 6
69
66
77
67
845
784
ATC 8
63
52
Glebe Road
99
87
909
842
Lid Lane
Bank Street
Charles Street
436
378
574
530
5576
5175
Tape Street
Royal Walk
ATC 7
25
19
22
18
322
272
91
71
40
35
819
675
The Birches
The Avenue
Mill Lane
ATC 5
826
725
768
722
9302
8680
708
599
873
793
9584
8949
A522 Tean Road

Appendix C1.1

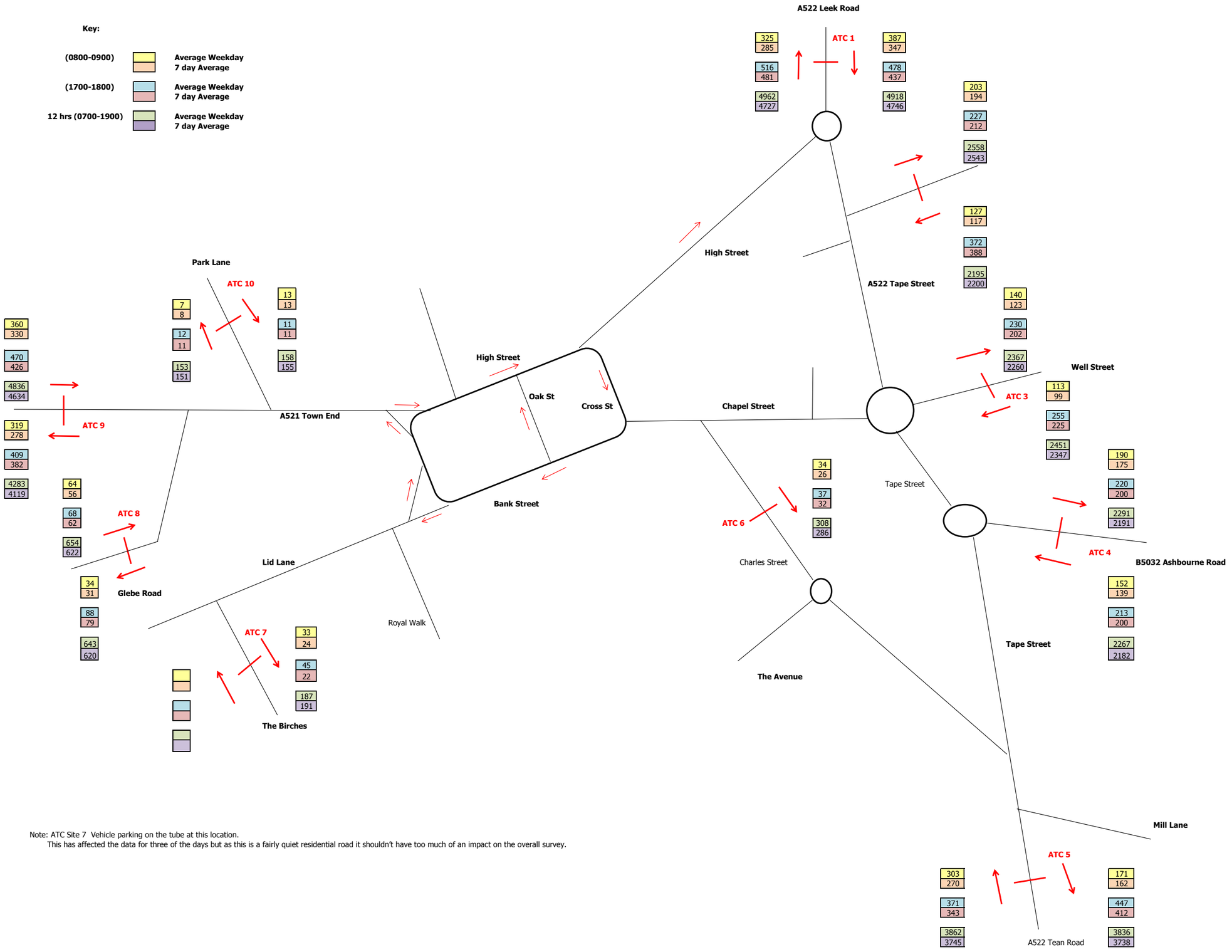
Cheadle Town Centre Study - Automatic Traffic Count (ATC) - Survey Date: 03/04/2015 to 09/04/2015 (Week 2 Traffic Survey)



Comment: The ATC Flow are based on the latest supplied version from Skyhigh.
The summary flow indicates the recorded data during this week is inconsistant compared to the previous survey week
therefore cannot be used for traffic comparison purposes

Appendix C1.2

Cheadle Town Centre Study - Automatic Traffic Count (ATC) - Survey Date: 23/05/2015 to 29/05/2015 (Week 3 Traffic Survey)



Note: ATC Site 7 Vehicle parking on the tube at this location.
This has affected the data for three of the days but as this is a fairly quiet residential road it shouldn't have too much of an impact on the overall survey.

Appendix C2.0 Cheadle Town entre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)

Key:

LV
HGV

Skyhigh Survey Data (01/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

High St

Park Lane

A521 Town End

Cross St

Oak St

Chapel St

Well St

Bank St

Tape St

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

B5032 Ashbourne Road

The Avenue

Baddeley St

Mill Lane

A522 Tean Road

Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Site 9
Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17

Appendix C2.0 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)		amey

Appendix C2.1

Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)

Key:

LV
HGV

Skyhigh Survey Data (01/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

High St

Park Lane

A521 Town End

Cross St

Oak St

Bank St

Chapel St

Well St

Tape St

B5032 Ashbourne Road

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

The Avenue

Baddeley St

Mill Lane

A522 Tean Road

Site 1

Site 2

Site 3

Site 4

Site 5

Site 6

Site 7

Site 8

Site 9

Site 10

Site 11

Site 12

Site 13

Site 14

Site 15

Site 16

Site 17

Appendix C2.1 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)	amey

Appendix C2.2 Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekend Inter-Peak

Key:

LV
HGV

Skyhigh Survey Data (04/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

Well St

Park Lane

A521 Town End

High St

Cross St

Oak St

Bank St

Chapel St

Tape St

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

The Avenue

B5032 Ashbourne Road

Baddeley St

Mill Lane

A522 Tean Road

Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
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Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17

Appendix C2.2 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekend Inter-Peak		amey

Appendix C2.3

Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)

Key:

LV
HGV

Skyhigh Survey Data (08/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

Well St

Park Lane

A521 Town End

High St

Cross St

Oak St

Chapel St

Bank St

Tape St

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

B5032 Ashbourne Road

The Avenue

Baddeley St

Mill Lane

A522 Tean Road

Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Site 9
Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17

Appendix C2.3 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Morning Peak (0800 - 0900)	amey

Appendix C2.4

Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)

Key:

LV
HGV

Skyhigh Survey Data (08/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

Well St

Park Lane

A521 Town End

High St

Cross St

Oak St

Chapel St

Bank St

Tape St

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

B5032 Ashbourne Road

The Avenue

Baddeley St

Mill Lane

A522 Tean Road

Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
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Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17

Appendix C2.4 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekday Evening Peak (1700 - 1800)	amey

Appendix C2.5 Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekend Inter-Peak

Key:

LV
HGV

Skyhigh Survey Data (11/04/15)

N

A522 Leek Road

B5417 Queen Street

A522 Tape St

High St

Park Lane

A521 Town End

High St

Cross St

Oak St

Chapel St

Well St

Bank St

Tape St

Glebe Road

Lid Lane

Royal Walk

The Birches

Charles St

B5032 Ashbourne Road

The Avenue

Baddeley St

Tape St

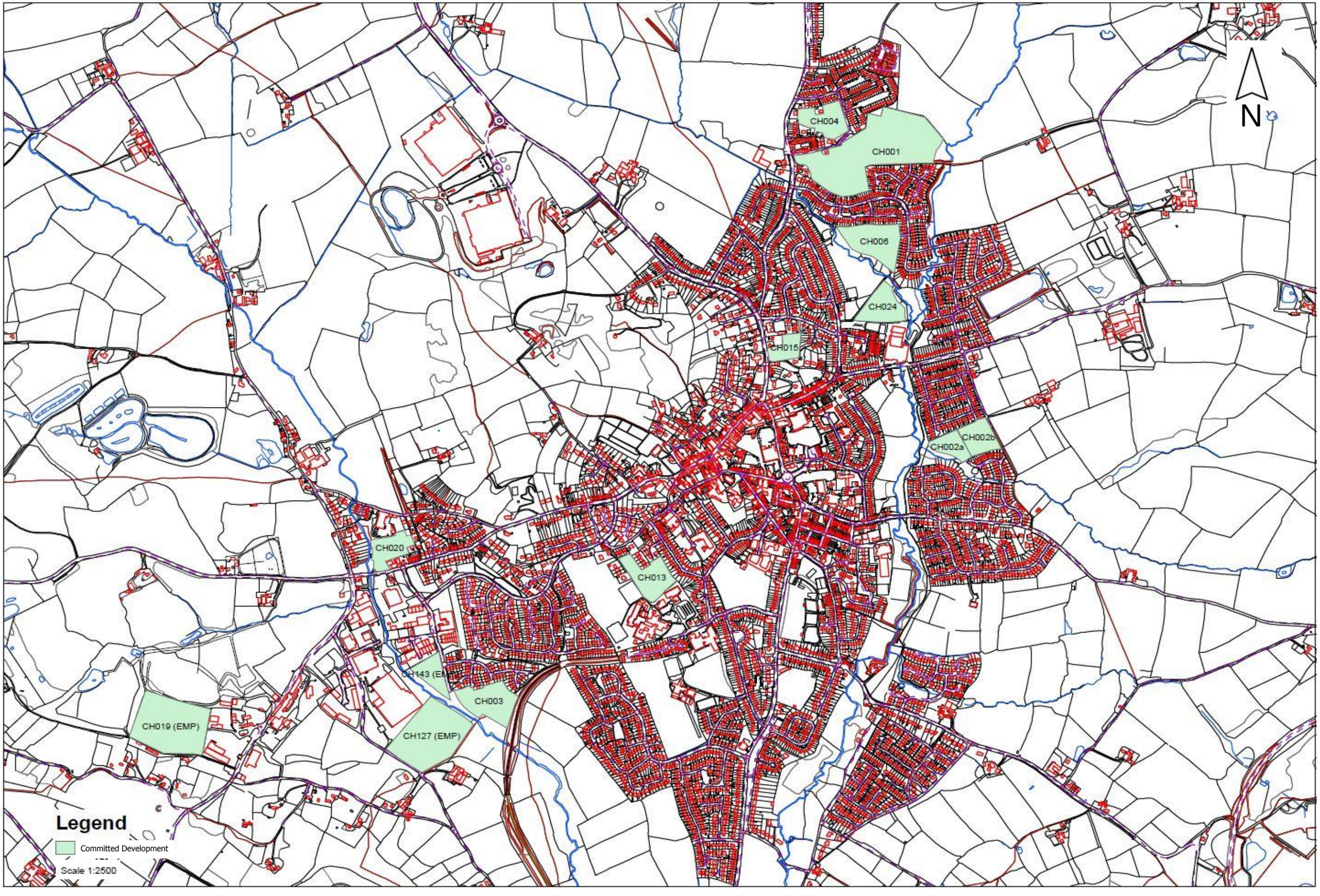
Mill Lane

A522 Tean Road

Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Site 9
Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17

Appendix C2.5 May 2015 COSTCDT6573	Cheadle Town Centre Study - Manual Classified Count (MCC) - Weekend Inter-Peak		amey

Appendix D1.0 Cheadle Town Centre Study - Predicted future Development Locations



Appendix D1.0 May 2015
COSTCDT6573

Cheadle Town Centre Study - Committed Develpoment Locations

amey

Appendix E1.0 AM & PM Peak Hour Summary Modelled Link Flow Comparison

		Worst Case Inc. Alton Tower Factor			Worst Case Inc. Alton Tower Factor		
		2015 AM Peak (0800 - 0900)			2015 PM Peak (1700 - 1800)		
		Modelled Link Flow			Modelled Link Flow		
Counter	**Link**	**Without Committed Development**	**With Committed Development**	**Flow Diff**	**Without Committed Development**	**With Committed Development**	**Flow Diff**
1	A521 Town End (EB)	519	700	181	580	740	160
2	A521 Town End (WB)	518	555	37	507	508	1
5	A522 Leek Road (SB)	603	649	46	629	609	-20
6	A522 Leek Road (NB)	540	579	39	602	630	28
7	B5417 Queen Street (WB)	271	283	12	330	272	-58
8	B5417 Queen Street (EB)	182	188	6	211	208	-3
9	Well Street (WB)	136	136	0	343	357	14
11	Well Street (EB)	212	227	15	248	263	15
12	B5032 Ashbourne Road (WB)	215	218	3	302	306	4
13	B5032 Ashbourne Road (EB)	280	298	18	373	377	4
14	A522 Tean Road (NB)	498	498	0	493	493	0
15	A522 Tean Road (SB)	457	514	57	643	645	2
16	The Birches (NB)	175	180	5	121	127	6
17	The Birches (SB)	89	95	6	29	29	0
18	Glebe Road (NB)	126	126	0	104	104	0
19	Glebe Road (SB)	72	80	8	192	195	3
20	Charles Street (SB)	128	151	23	55	61	6
100	The Terrace (EB)	641	817	176	682	839	157
101	The Terrace (WB)	584	623	39	697	701	4
102	A521 High Street	821	998	177	815	975	160
103	A521 Bank Street	696	752	56	745	746	1
104	A522 Tape Street (NB)	429	429	0	491	498	7
105	A522 Tape Street (SB)	833	905	72	1042	973	-69
106	A522 Tape Street (NB) - between Well Street and Ashbourne Road	678	679	1	692	707	15
107	A522 Tape Street (SB) - between Well Street and Ashbourne Road	642	717	75	943	949	6
108	A522 Tape Street (NB) - between Ashbourne Road and Charles Street	601	602	1	546	555	9
109	A522 Tape Street (SB) - between Ashbourne Road and Charles Street	495	554	59	714	718	4
110	A521 Chapel Street (WB)	626	649	23	712	696	-16
111	A521 Chapel Street (EB)	266	319	53	304	379	75

Appendix E1.0: AM & PM Peak Hour Summary Modelled Link Flow Comparison