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# Attleborough Town Centre Transport Study

## Final Report

October 2013


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# 1. Executive Summary

The urban extension planned for Attleborough will place additional strain on the existing town centre one-way system and worsen the oppressive conditions which already exist for pedestrians and cyclists within the town centres' core.

The Attleborough Town Centre Transport Study considers the likely impact of the plans for growth and assesses a number of possible interventions to determine the type and scale of transport infrastructure required to accommodate new development. It is intended that the study will provide the evidence base required to support the Local Plan to demonstrate that the allocated sites are deliverable.

An extensive data collection exercise has been undertaken to inform our understanding of the baseline conditions on the local transport networks and to develop fit for purpose tools to assess the impact of future development and the measures proposed to support it.

A review of existing routes and facilities for walking, cycling and public transport has been undertaken and a number of measures identified to improve existing conditions and help to promote sustainable options as a realistic alternative to SOV for trips generated by new development. The amount and type of parking stock within the town centre has also been reviewed and a number of suggestions put forward to address parking issues.

Initial observations and journey time analysis suggests that there is limited congestion within Attleborough town centre at present with notable queuing occurring in a small number of locations including: junction of Church Street / Norwich Road, junction of Connaught Road / Station Road, Station Road level crossing, Exchange Street / Connaught Road and junction of High Street / Hargham Road. Before and after surveys at the Station Road level crossing indicate that wait times have been significantly reduced (by more than 3 minutes on average) as a result of the automation of the level crossing and that conditions on the town centre gyratory are also much improved as a result of this upgrade.

The traffic impact assessment of the urban extension is broadly based on the Scott Wilson masterplan amended to take account of committed development proposals and more recent discussions between Breckland Council planners and developers. A calibrated/validated base model has been developed based on observed data including ANPR survey data, traffic counts and journey time surveys.

The future year forecasting undertaken to assess the impact of committed and proposed development and infrastructure improvements indicates that alterations to the town centre network which introduce two-way traffic to Surrogate Street and Connaught Road improve network operation and are capable of mitigating the impacts of development up to 2021. Beyond 2021 traffic speeds are significantly reduced as a consequence of further development and background growth.

Traffic models which include alternative proposals for a western link road between the B1077 Buckenham Road and London Road (based on options presented in the Attleborough Link Road Study) indicate that such a scheme would deliver network benefits capable of supporting traffic growth between 2024 and 2031 by relieving the town centre network of through traffic. A comparison of the Link Road options presented within the Link Road Report indicates that Link Road Option SK03; which provides a wrap-around link road of a 50/60mph design standard, offers the greatest benefits and is shown to largely mitigate the impact of development.

However, it should be noted that there is some residual detrimental impact on the local network although this is comparable with the level of performance which would be experienced as a consequence of background growth without further development in Attleborough.

# 2. Introduction

## 2.1 Context

Through the emerging Breckland Local Plan (Local Plan), Breckland Council is effectively proposing to double the population of Attleborough, allocating 4,000 new houses and ten hectares of employment land at Attleborough, and releasing an additional twenty hectares of employment land at Snetterton Heath. The proposals also include an expanded high school, two to three primary schools and a new supermarket. In January 2013 Breckland Council formally abandoned a separate Area Action Plan for Attleborough, deciding to include these proposals within a new single Local Plan document.

There are likely to be a number of challenges in delivering such major growth in a sustainable manner. In the summer of 2012, Capita Symonds was commissioned by Breckland Council to undertake a package of work to consider transport requirements to support these plans for growth. The package of work included three separate studies to develop the existing policy framework for transport in and around Attleborough including consideration of smarter choices, town centre transport improvements and a possible future link road.

The purpose of this document is to identify a preferred transport strategy for the town centre with robust justification for any proposed measures to ensure that Attleborough is capable of accommodating future growth sustainably. The study has been overseen by a working group consisting of Breckland Council, Norfolk County Council and Capita Symonds.

## 2.2 Aims and Objectives

At the outset of the study a realistic vision for Transport in Attleborough town centre was outlined as follows:

*"To identify a successful and balanced provision of transport infrastructure and facilities, for pedestrians and cyclists, public transport and other vehicles to achieve a sustainable future for Attleborough town centre."*

This vision is to be delivered through the pursuit of the following strategic objectives:

1) Create a safe, attractive environment for walking and cycling;
2) Increase levels of public transport use;
3) Manage the interaction of different transport uses in the town centre; and
4) Enhance and develop quality transport infrastructure.

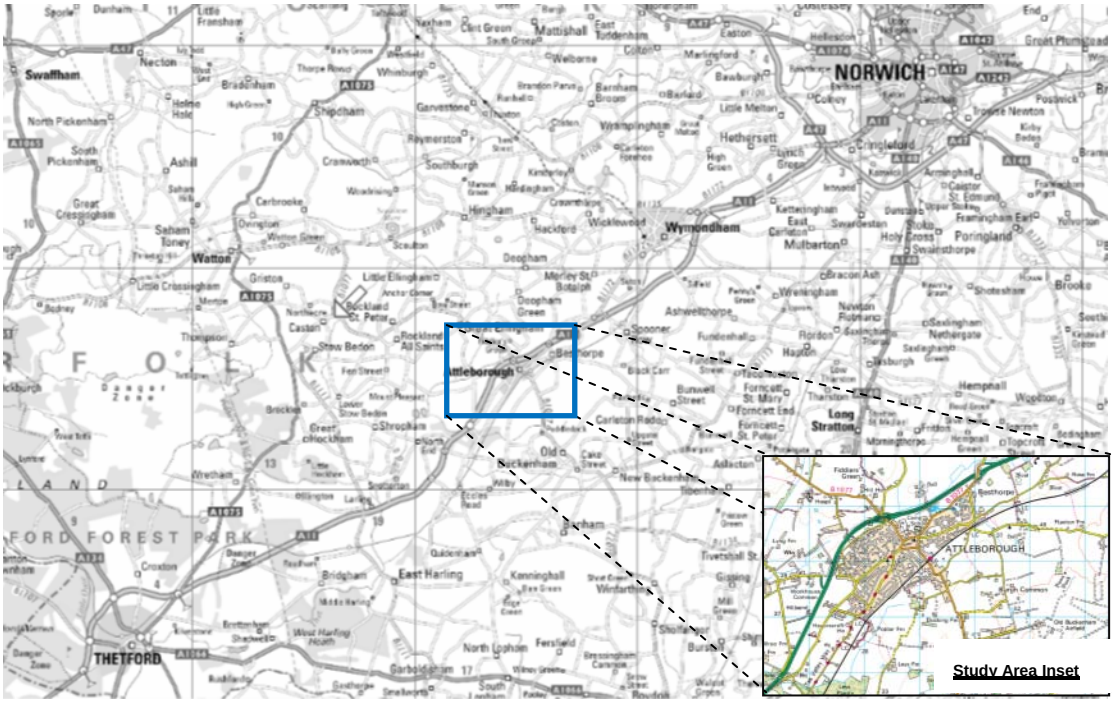
The urban extension planned for Attleborough will place additional strain on the existing town centre one-way system and worsen the oppressive conditions which already exist for pedestrians and cyclists within the town centres' core. By adopting an approach which considers the needs of the most vulnerable road users first, it is hoped that the delivery of the above vision will deliver a town centre which will be both more attractive to walk and cycle around and also function efficiently to accommodate the inevitable future traffic growth associated with new development and economic growth.

## 2.3 Study Area

Attleborough is a market town and civil parish in Norfolk, England situated between Norwich and Thetford. The town is bordered to the south by the Norwich to Cambridge rail line which acts as a barrier to movement between the current built form of the town and potential areas for

expansion as identified in the 2010 Local Plan Issues and Options consultation. The purpose of this study is to consider the transportation impact of these plans for growth on the town centre. However, there has also been a need to consider the wider network. The location of the study area is illustrated in Figure 2.1 below.

**Figure 2.1 – Study Area Location Plan**




The town principally comprises of the Queen's and Burgh Haverscroft wards within the Local Authority area of Breckland Council which have a combined population of 11,100 living in 4,760 households[1]. The proposal for 4,000 new homes therefore represents a significant 84% increase. The adjoining Parishes of Old Buckenham to the south and Great Ellingham to the north are also considered.

## 2.4 Study Brief

The specific aims and objectives for this study have been identified to ensure that the appropriate technical evidence is provided to Breckland Council to inform the policy approach in the Local Plan. These aims include:

- Demonstrate that the needs of all user groups have been considered;
- Seek to strike an appropriate balance between place and movement functions;
- Recognise the context and presence of wider strategic modal routes and the impact any measures may have;
- Ensure that the quality of the existing public realm is maintained or improved and that new places are of high quality;
- Meet community needs;
- Consider road safety and personal security;
- Seek to identify solutions through cost effective design and implementation; and
- Develop an implementation plan for enhancing the town centre transport network.

[1] 2011 Census

Risk exists where a new development which is intended to boost the local and regional economies, results in increased congestion and travel delay that would be detrimental to those economies and the local environment. In order to support the Local Plan an evidence base is required which demonstrates that the allocated sites are deliverable. This includes showing that the necessary physical infrastructure is in place and will not constrain development going forward. The efficient operation of the local highway network is critical to the successful delivery of the transformational agenda in the Local Plan.

All partners interested in the successful delivery of the Local Plan are committed to preventing the town centre from becoming blighted by further traffic growth and congestion, and encouraging the uptake of non-car modes of transport. Norfolk's Third Local Transport Plan (LTP3) provides the mechanism through which improvements to local transport can be made and work has already been undertaken in the Attleborough area on small scale improvements such as the implementation of cycle routes, pedestrian crossing improvements and the recent upgrade of the manual level crossing to automated operation. However, further improvements will be needed to support future growth and other funding streams may need to be considered to secure their delivery.

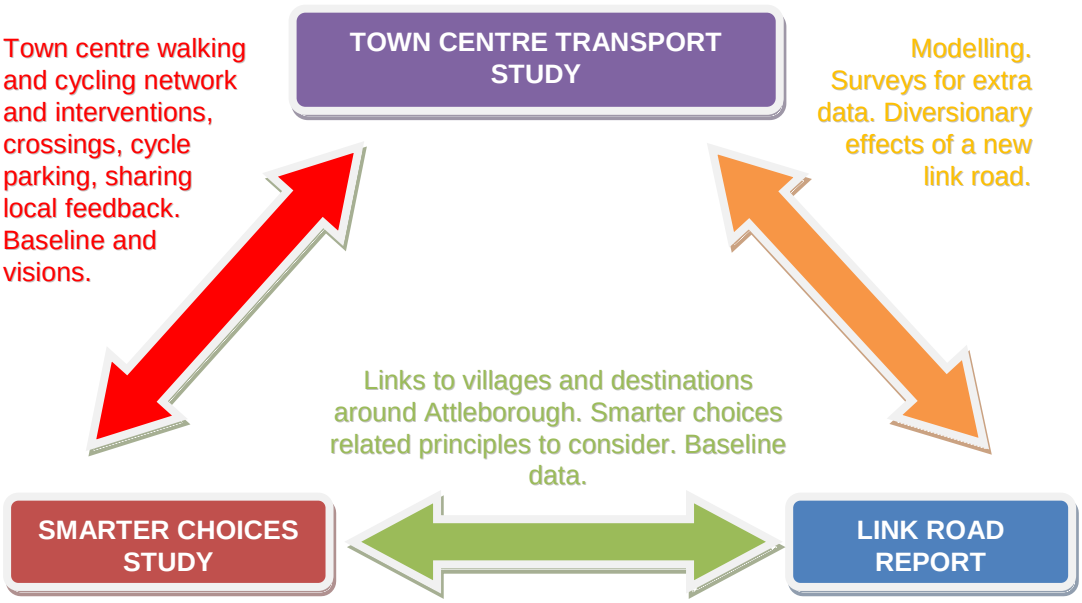
This Town Centre Transport Study for Attleborough, therefore needs to confirm the contents of a package of improvements for the town centre transport network and prioritise these measures in accordance with what is needed to tackle future transport issues and provide a roadmap of infrastructure requirements to support planned growth.

## 2.5 Links with Other Studies

At the same time as commissioning the Town Centre Transport Study, Breckland Council also commissioned studies to look into the potential of Smarter Choices and also to look in more detail at a new link road between the B1077 to the south of the railway and London Road.

All three studies were awarded to Capita Symonds in the summer of 2012 offering the opportunity for close working between the three separate project teams. Figure 2.2 below illustrates the interactions between the three teams.

**Figure 2.2 – Interactions Between the Three Transport Studies**



# 3. Data Collection

## 3.1 Background

We have collected survey data from a number of sources including a Post Opening Project Evaluation (POPE) assessment of the A11 widening scheme undertaken by the Highways Agency in 2007, the development of a town centre micro-simulation traffic model (S-Paramics) undertaken by Bidwell's (Ptarmigan's highways consultants) and other ad-hoc surveys.

Whilst the brief for this study directed that existing data should be used wherever possible in order to ensure a value for money approach it was also necessary to undertake a number of additional surveys for the specific purposes of this town centre transport study and the associated link road study.

Information relating to the traffic survey data collected and those surveys undertaken specifically required to fill the gaps is summarised in the following paragraphs, with the location of all count sites illustrated in Appendix A.

## 3.2 Pre-existing Traffic Data

### *3.2.1 Link Counts*

The link count data identified includes surveys from a variety of sources and covering different durations ranging from twelve hour surveys to two week surveys. Each of the surveys identified are listed in Table 3.1 below.

**Table 3.1 – Existing Link Count Data**

| LOCATION | DATES |
|---|---|
| B1077 ATTLEBOROUGH RD, GT ELLINGHAM | 01/01/2011 To 01/01/2012 |
| A11 BESTHORPE BYPASS, BESTHORPE | 01/01/2010 To 01/01/2011 |
| BUCKENHAM ROAD, ATTLEBOROUGH | 21/02/2009 To 27/02/2009 |
| B1077 CONNAUGHT ROAD | 23/01/2009 To 02/02/2009 |
| C572 LONDON ROAD | 27/06/2008 To 27/06/2008 |
| C136 LONG STREET, GRAT ELLINGHAM | 05/09/2007 To 02/10/2007 |
| NORWICH (A11 ON SLIP) | 02/03/2012 To 16/03/2012 |
| NORWICH ROAD B'WEEN MILL LANE & A11 OFF SLIP | 02/03/2012 To 16/03/2012 |
| DEOPHAM ROAD N'TH OF A11 ON SLIP | 02/03/2012 To 16/03/2012 |
| MILL LANE N'TH OF SILVER STREET | 02/03/2012 To 16/03/2012 |
| ELLINGHAM ROAD S'TH OF WARREN LANE | 02/03/2012 To 16/03/2012 |
| QUEENS ROAD B'WEEN A11 SLIP ROAD 7 QUEENS COURT | 02/03/2012 To 16/03/2012 |
| SILVER STREET EAST OF WHITE HORSE LANE | 02/03/2012 To 16/03/2012 |
| STATION ROAD B'WEEN CONNAUGHT ROAD & NEW NORTH RD | 02/03/2012 To 16/03/2012 |
| WEST CARR ROAD EAST OF LONG STREET | 02/03/2012 To 16/03/2012 |
| WROO ROAD B'WEEN SWANGEY LANE & A11 | 02/03/2012 To 16/03/2012 |
| B1077 LONDON ROAD EAST OF A11 | 02/03/2012 To 16/03/2012 |

### 3.2.2 *Turning Counts*

Turning count data has been made available for a number of junctions within Attleborough town centre by Ptarmigan's highways consultants Bidwell's. All of the turning count surveys date from October 2007. The location of each of the turning counts available is presented in Table *3.2* below with turning count data for each peak period presented in Appendix B.

**Table 3.2 – Existing Turning Count Data**

| LOCATION | DATES |
|---|---|
| NORWICH ROAD JUNCTION WITH A11 ON SLIP | 10/10/2007 To 10/10/2007 |
| NORWICH ROAD JUNCTION WITH A11 OFF SLIP | 10/10/2007 To 10/10/2007 |
| QUEENS ROAD JUNCTION WITH A11 SLIPS (NORTHSIDE) | 10/10/2007 To 10/10/2007 |
| QUEENS ROAD JUNCTION WITH A11 SLIPS (SOUTHSIDE) | 10/10/2007 To 10/10/2007 |
| DEOPHAM ROAD JUNCTION WITH A11 SLIP ROAD | 10/10/2007 To 10/10/2007 |
| BLACKTHORN ROAD JUNCTION WITH A11 SLIP ROAD | 10/10/2007 To 10/10/2007 |
| A11 JUNCTION WITH LONDON ROAD (QUARRY AREA) | 10/10/2007 To 10/10/2007 |
| NORWICH ROAD / BESTHORPE ROAD / SURROGATE STREET | 10/10/2007 To 10/10/2007 |
| THIEVES LANE / SURROGATE STREET / STATION ROAD | 10/10/2007 To 10/10/2007 |
| CONNAUGHT ROAD / HIGH STREET / EXCHANGE STREET | 10/10/2007 To 10/10/2007 |
| QUEENS ROAD / EXCHANGE STREET / CHURCH STREET | 10/10/2007 To 10/10/2007 |

### 3.2.3 *ANPR Surveys*

Bidwell's ANPR surveys were undertaken in various locations as presented in Table 3.3 below, on the 7th October 2009 and achieved a high level of matching as shown in Table 3.4 overleaf. Matrices showing the 2009 results for the AM and PM peak periods by vehicle class are presented in Appendix C.

**Table 3.3 – Bidwells ANPR Survey Data**

| LOCATION | DATES |
|---|---|
| B1077 QUEENS ROAD ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| QUEEN'S SQUARE CAR PARK ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| NORWICH ROAD ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| BESTHORPE ROAD ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| THIEVES LANE ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| B1077 STATION ROAD ANPR SURVEY | 07/10/2009 To 07/10/2009 |
| HIGH STREET ANPR SURVEY | 07/10/2009 To 07/10/2009 |

**Table 3.4 – ANPR Registration Plate Matching Results**

| NO. | LOCATION | RECORDS | MATCHED | UNMATCHED | SELECTED | MATCHING RATE |
|---|---|---|---|---|---|---|
| 1 | I-B1077 STATION ROAD | 1616 | 1483 | 133 | 1616 | 91.77% |
| 2 | O-B1077 STATION ROAD | 1978 | 1773 | 205 | 1978 | 89.64% |
| 3 | I-HIGH STREET | 2464 | 2183 | 281 | 2464 | 88.60% |
| 4 | O-HIGH STREET | 2535 | 2242 | 293 | 2535 | 88.44% |
| 5 | I-B1077 QUEENS ROAD | 1442 | 1294 | 148 | 1442 | 89.74% |
| 6 | O-B1077 QUEENS ROAD | 1650 | 1397 | 253 | 1650 | 84.67% |
| 7 | I-CAR PARK | 452 | 364 | 88 | 452 | 80.53% |
| 8 | O-CAR PARK | 579 | 487 | 92 | 579 | 84.11% |
| 9 | I-NORWICH ROAD | 1907 | 1748 | 159 | 1907 | 91.66% |
| 10 | O-NORWICH ROAD | 1671 | 1442 | 229 | 1671 | 86.30% |
| 11 | I-BESTHORPE ROAD | 92 | 78 | 14 | 92 | 84.78% |
| 12 | O-BESTHORPE ROAD | 217 | 194 | 23 | 217 | 89.40% |
| 13 | I-THIEVES LANE | 732 | 626 | 106 | 732 | 85.52% |
| 14 | O-THIEVES LANE | 320 | 241 | 79 | 320 | 75.31% |

*3.2.4 Journey Time Data*

In addition to the traffic counts outlined above a number of journey time surveys were also undertaken in 2012 for the A11 POPE evaluation of the Highway Authority's A11 widening scheme. The journey time surveys were undertaken using a moving observer technique and included at least six journey time runs on each route, in each direction, in each time period (AM peak 7.00-9.00, Inter-peak 10.00-15.00, PM peak 16.00-18.00). The routes assessed are shown in Table 3.5 below and Figure 3.1 overleaf.

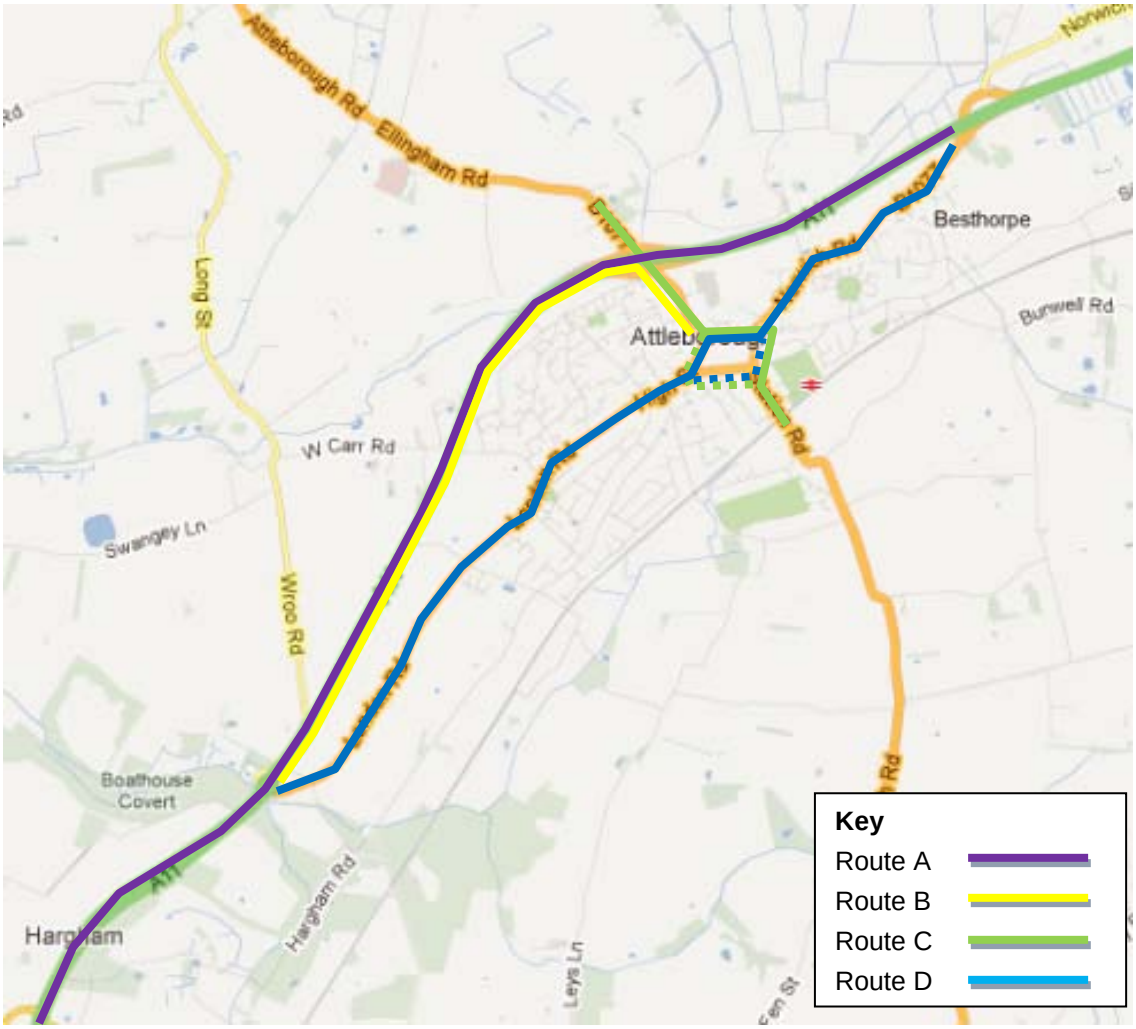
**Table 3.5 – Existing Journey Time Surveys Data**

| JOURNEY TIME SURVEYS | ROUTE NAME* | TIMING POINTS |
|---|---|---|
| A11 RUNNING BETWEEN HARGHAM ROAD AND JUST SOUTH OF THE BESTHORPE JUNCTION (SCHEME ROUTE) | A | 3 |
| RUNNING THROUGH ATTLEBOROUGH BETWEEN LONDON ROAD/ FEN ROUNDABOUT WITH A11 TO BESTHORPE | B | 9 |
| RUNNING THROUGH ATTLEBOROUGH ACROSS THE A11 CORRIDOR FROM STATION ROAD/ NEW NORTH ROAD TO | C | 7 |
| RUNNING FROM THE CENTRE OF ATTLEBOROUGH ONTO THE A11 AND CONTINUING TO THE FEN JUNCTION WITH | D | 3 |

*Coloured letters correspond to routes shown in Figure 3.1 overleaf.

Detailed outputs from the journey time surveys are presented in Appendix D.

**Figure 3.1 – A11 Widening POPE Journey Time Survey Routes**




### 3.2.5 *Development Related Transport Assessments*

Further to the information outlined above we have also attempted to review any transport assessments submitted with recent planning permissions. Having been advised that there have been a number of recent applications which may have been of interest we interrogated the planning portal for information on the following planning applications:

1. 3PL/2012/0528/H - Taylor Wimpey, London Road
2. 3PL/2009/0089/F – Sainsbury's extension
3. 3PL/2005/0972/F - Extensions to Banham Poultry factory

Only the Taylor Wimpey application for 375 residential properties had any transport related information available and included turning count data for Wednesday 28th January 2010, at the junctions shown in Table 3.6 overleaf. It also included a pedestrian count survey at the junction of High Street / Connaught Road for Wednesday 28th January 2010 as shown in Table 4.9.

**Table 3.6 – London Road Residential Development Transport Assessment**

| LOCATION | DATES |
|---|---|
| London Road / Dodds Road | 28/01/2010 To 28/01/2010 |
| High Street / Connaught Road / Exchange Street | 28/01/2010 To 28/01/2010 |
| Hunter's Lodge Roundabout | 28/01/2010 To 28/01/2010 |

## 3.3 Additional Survey Data

### *3.3.1 Capita Symonds ANPR Surveys*

To estimate traffic flows on the proposed link road and associated junctions, both existing traffic flows need to be measured and future traffic flows calculated. Existing traffic survey information has been provided via various sources including previous reports, the Highways Agency and Norfolk County Council. This data includes numerous automatic traffic counts, an Automatic Number Plate Recognition (ANPR) survey of the town centre gyratory, journey time surveys and junction classified counts.

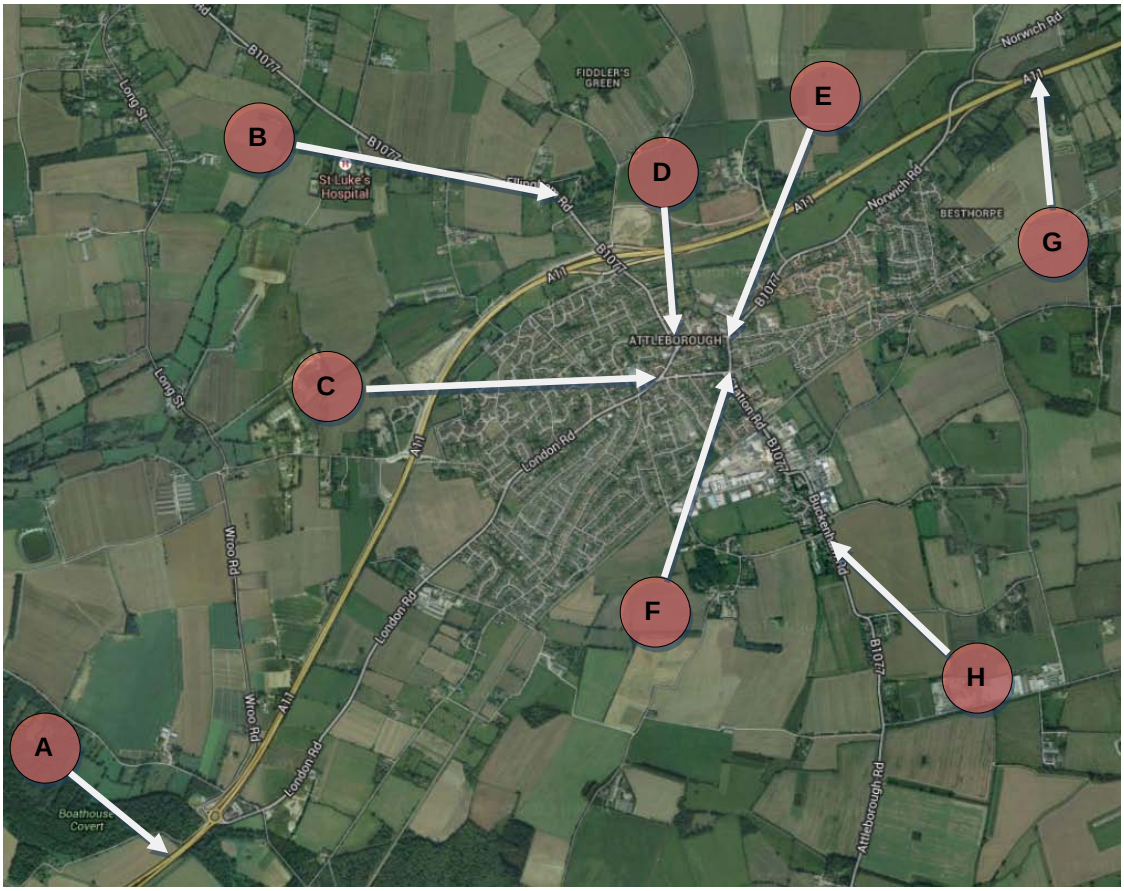
The existing traffic information provides details of traffic flows on many links within Attleborough but minimal information, except on the gyratory, of routing patterns. This results in a significant lack of data on which to base the reassignment of traffic onto the link road and to quantify the resulting reduction in traffic within the town centre. As such Nationwide Data Collection Ltd were appointed by Capita Symonds in November 2012 to undertake the additional surveys deemed to be required to robustly assess the potential for reassignment of traffic on the highway network.

The surveys were undertaken on Tuesday 27th November 2012 to cover the time periods of 0730-0930 and 1530-1730 hours (to take into account Attleborough High School and Sixth Form Centre opening times of 08:55 – 15:40 hours). The results were provided in 15 minute survey intervals with classifications consisting of Cars, LGV, OGV1, OGV2 and PSV. The location of these new ANPR surveys is as follows:

- (A) A11 South of Breckland Lodge Roundabout
- (B) Attleborough Road (north of A11)
- (C) High Street (adjacent to gyratory)
- (D) Queen's Road (adjacent to gyratory)
- (E) Norwich Road (adjacent to gyratory)
- (F) Station Road (adjacent to gyratory)
- (G) A11 North of Norwich Road
- (H) B1077 (North of Bunn's Bank Road)

The location of these sites is illustrated in Figure 3.2 overleaf. Automatic Traffic Count surveys were also undertaken at each of these locations to verify the number of ANPR observations made against total traffic flow. Additional classified link counts were also undertaken at the aforementioned locations to review the junction type of any possible connection with the proposed link road.

**Figure 3.2 – Capita Symonds ANPR Survey Locations**




The Capita Symonds ANPR surveys achieved a similarly high level of matching to the Bidwell's surveys for inner cordon to inner cordon. Match rates for outer cordon to outer cordon movements and inner cordon to outer cordon movements were lower as expected. Matrices showing the 2012 ANPR survey results for the AM and PM peak periods by vehicle class are presented in Appendix E.

### 3.3.2 *Car Parks*

A Capita Symonds survey of both on and off street parking availability was undertaken on Thursday 13th June 2013. This was a market day during term time and was therefore considered to reflect worse case conditions. This is presented in Appendix F.

### 3.3.3 *Level Crossing Survey*

A level crossing survey was undertaken in 2010 when the level crossing was under manual operation and recorded the duration of each closure and details whether or not the barrier was opened between trains running close together. A simultaneous link count survey was also undertaken in this location, the full results are presented in Appendix G.

Capita Symonds has undertaken an additional survey to assess if the upgrade of the level crossing to radar control has delivered any time savings during the peak periods. The details of these surveys are shown in Table 3.7 overleaf.

**Table 3.7 – Level Crossing Survey Data**

| LOCATION | DATES |
|---|---|
| MANUAL LEVEL CROSSING SURVEY | 10/12/2010 To 10/12/2010 |
| RADAR CONTROLLED (UPGRADED) LEVEL CROSSING SURVEY | 05/03/2013 To 05/03/2013 |

### *3.3.4 Signing and Lining*

A desktop study using site photographs, video surveys and Google Streetview has been undertaken to assess existing signing and lining provision on the Attleborough town centre one-way system and the approach to it. The findings of this study can be found in Appendix H.

# 4. Baseline Conditions

## 4.1 Overview

In order to identify the emerging themes that could influence the operation of the town centre's transport network in the future, it is first necessary to identify what the existing situation is with regard to transport. This has been undertaken in a number of ways for this study, including the review of available data and previous engagement with the public and stakeholders. The findings from these consultations are summarised later in this report.

This section of the report considers the present character of the study area, identifies key constraints and includes consideration of present travel characteristics and demands. This has enabled us to build up a detailed understanding of the characteristics of the area, current issues, whether they are perceived or actual and begin to develop potential solutions.

## 4.2 Character of the Study Area

This section provides information from the 2011 and 2001 Census for England that classifies census data on neighbourhood statistics. The data being used is for Attleborough (both Queen's and Burgh Haverscroft wards), Breckland, East of England and England.

### *4.2.1 Levels of Car or Van Ownership*

This section provides information from the 2001 and 2011 Census for England that classifies households by the number of cars or vans available to members of the household. It also provides details of the total number of cars and vans in Attleborough (both Queen's and Burgh Haverscroft wards), Breckland, East of England and England.

In general terms, the figures for car or van availability in Attleborough are similar to those which have been recorded at a district (Breckland), regional (East of England) and national level as shown in Table 4.1 below:

**Table 4.1 - Access to a Car or Van (2011 Census)**

| Car or Van Availability | Attleborough | | Breckland | | East of England | | England | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | % | 2011 | % | 2011 | % | 2011 | % |
| All Households (HH) | 4,760 | | 54,519 | | 2,423,035 | | 22,063,368 | |
| No Cars or Vans in HH | 774 | 16 | 8,462 | 16 | 449,358 | 19 | 5,691,251 | 26 |
| 1 Car or Van in HH | 2,154 | 45 | 23,904 | 44 | 1,039,677 | 43 | 9,301,776 | 42 |
| 2 Cars or Vans in HH | 1,388 | 29 | 16,504 | 30 | 703,968 | 29 | 5,441,593 | 25 |
| 3 Cars or Vans in HH | 330 | 7 | 4,092 | 8 | 166,426 | 7 | 1,203,865 | 5 |
| 4 or More Cars or Vans in HH | 114 | 2 | 1,557 | 3 | 63,606 | 3 | 424,883 | 2 |
| All Cars or Vans in Area | 6,439 | | 76,224 | | 3,231,763 | | 25,696,833 | |

In total there are 6,439 cars or vans in Attleborough according to the 2011 Census; 16% of households have no car or van, 45% have one car or van, 29% have two, 7% have three and 2% have four or more. Attleborough has relatively high levels of car ownership as compared to the whole of England and it can be seen from Table 4.2 overleaf that the proportion of households without access to a car has decreased by 3% between the 2001 and 2011 data.

There have been significant increases in the number of households with two, three and four or more cars or vans per household between 2001 and 2011. There has especially been a significant increase of 93% in the number of households with access to four or more cars or vans.

**Table 4.2 - Access to a Car or Van, Comparison of 2001 and 2011 Census Data**

| Car or Van Availability | Attleborough | | | | |
|---|---|---|---|---|---|
| | 2001 | % | 2011 | % | % Change |
| All Households | 4,386 | | 4,760 | | 9 |
| No Cars or Vans in Household | 802 | 18 | 774 | 16 | -3 |
| 1 Car or Van in Household | 2,101 | 48 | 2,154 | 45 | 3 |
| 2 Cars or Vans in Household | 1,214 | 28 | 1,388 | 29 | 14 |
| 3 Cars or Vans in Household | 210 | 5 | 330 | 7 | 57 |
| 4 or More Cars or Vans in H'hold | 59 | 1 | 114 | 2 | 93 |
| All Cars or Vans in Area (Veh) | 5,416 | | 6,439 | | 19 |

### *4.2.2 Travel to Work Trends*

This section provides information that classifies usual residents aged 16 to 74 by their method of travel to work. It can be seen in Table 4.3 below that the figures for driving a car or van to work in Attleborough are significantly higher than for England, with 48% using this mode compared to 37% for England. However, a higher percentage of people walk to work in Attleborough (9%) than in the district, region and country (7%). A lower percentage travel to work by bus, minibus or coach in Attleborough (1%) compared with the region (3%) and the country (5%).

**Table 4.3 – Method of Travel to Work (2011 Census)**

| Method of Travel to Work | Attleborough* | | Breckland | | East of England | | England | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | % | 2011 | % | 2011 | % | 2011 | % |
| All Usual Residents Aged 16 to 74 | 8,020 | | 94,176 | | 4,245,544 | | 38,881,374 | |
| Work From Home | 233 | 3 | 3,799 | 4 | 161,428 | 4 | 1,349,568 | 3 |
| Tube or Light Rail | 5 | 0 | 48 | 0 | 33,110 | 1 | 1,027,625 | 3 |
| Train | 126 | 2 | 505 | 1 | 205,077 | 5 | 1,343,684 | 3 |
| Bus, Minibus or Coach | 84 | 1 | 1,294 | 1 | 106,303 | 3 | 1,886,539 | 5 |
| Taxi | 16 | 0 | 230 | 0 | 13,227 | 0 | 131,465 | 0 |
| Powered Two Wheelers | 41 | 1 | 506 | 1 | 22,475 | 1 | 206,550 | 1 |
| Driving a Car or Van | 3,820 | 48 | 42,156 | 45 | 1,757,121 | 41 | 14,345,882 | 37 |
| Passenger (Car or Van) | 293 | 4 | 3,766 | 4 | 143,749 | 3 | 1,264,553 | 3 |
| Bicycle | 174 | 2 | 1610 | 2 | 100,651 | 2 | 742,675 | 2 |
| On Foot | 696 | 9 | 6,975 | 7 | 288,663 | 7 | 2,701,453 | 7 |
| Other | 42 | 1 | 412 | 0 | 17,708 | 0 | 162,727 | 0 |
| Not in Employment | 2,490 | 31 | 32,875 | 35 | 1,396,032 | 33 | 13,718,653 | 35 |

*Attleborough includes the wards of Queen's and Burgh Haverscroft

Table 4.4 overleaf presents the 2011 travel to work percentages by mode for Attleborough residents and compares these to the statistics from the 2001 census. It can be seen that 52% of

all working residents travel to work by car or van (either as a driver or passenger). This is greater than the 49% figure for 2001. There are notable increases in the number of people getting to work by train (an increase of 193%) and on foot (49% increase). There are significant decreases in the number of people working from home (47% decrease) and also travelling to work by bicycle (29% decrease). Other mode percentages remain largely unchanged with numbers travelling to work by bus, taxi and powered two wheelers remaining very low.

**Table 4.4 – Comparison of 2001 and 2011 Census Travel to Work Statistics**

| Method of Travel to Work | Attleborough | | | | |
|---|---|---|---|---|---|
| | 2001 | % | 2011 | % | % Change |
| All Usual Residents Aged 16 to 74 | 7,219 | | 8,020 | | 11 |
| Work Mainly at or From Home | 439 | 6 | 233 | 3 | -47 |
| Underground, Metro, Light Rail, Tram | 0 | 0 | 5 | 0 | 0 |
| Train | 43 | 1 | 126 | 2 | 193 |
| Bus, Minibus or Coach | 96 | 1 | 84 | 1 | -13 |
| Taxi | 12 | 0 | 16 | 0 | 33 |
| Motorcycle, Scooter or Moped | 48 | 1 | 41 | 1 | -15 |
| Driving a Car or Van | 3,196 | 44 | 3,820 | 48 | 20 |
| Passenger in a Car or Van | 340 | 5 | 293 | 4 | -14 |
| Bicycle | 246 | 3 | 174 | 2 | -29 |
| On Foot | 467 | 6 | 696 | 9 | 49 |
| Other Method of Travel to Work | 16 | 0 | 42 | 1 | 163 |
| Not in Employment | 2,316 | 32 | 2,490 | 31 | 8 |

### *4.2.3 Economic Activity*

This section provides information that classifies usual residents aged 16 to 74 by economic activity and inactivity. This includes people in full-time and part time work, the self-employed, economically active students, unemployed people seeking a job and the long-term sick or disabled.

In Attleborough, the recorded economic activity rates are 72%. This is slightly higher than the national level of 70% as shown in Table 4.5 overleaf. Full-time employees account for a substantial 43% of the economically inactive in Attleborough and represent the prime reason behind the high activity rate in the district.

**Table 4.5 – Economic Activity (2011 Census)**

| Economic Activity | Attleborough | | Breckland | | East of England | | England | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | % | 2011 | % | 2011 | % | 2011 | % |
| All Usual Residents Aged 16 to 74 | 8020 | | 94176 | | 4245544 | | 38881374 | |
| **Economic Activity (EA); Total** | **5806** | **72** | **65029** | **69** | **3038090** | **72** | **27183134** | **70** |
| EA; Employee; Part-Time | 1203 | 15 | 13772 | 15 | 606944 | 14 | 5333268 | 14 |
| EA; Employee; Full-Time | 3442 | 43 | 36350 | 39 | 1696374 | 40 | 15016564 | 39 |
| EA; Self-Employed with Employees; Part-Time | 17 | 0 | 320 | 0 | 16043 | 0 | 148074 | 0 |
| EA; Self-Employed with Employees; Full-Time | 132 | 2 | 1709 | 2 | 81659 | 2 | 715271 | 2 |
| EA; Self-Employed Without Employees; Part-Time | 164 | 2 | 2455 | 3 | 116198 | 3 | 990573 | 3 |
| EA; Self-Employed Without Employees; Full-Time | 423 | 5 | 5015 | 5 | 232348 | 5 | 1939714 | 5 |
| EA; Unemployed | 233 | 3 | 3302 | 4 | 161631 | 4 | 1702847 | 4 |
| EA; Full-Time Student | 192 | 2 | 2106 | 2 | 126893 | 3 | 1336823 | 3 |
| **Economic Inactivity (EI); Total** | **2214** | **28** | **29147** | **31** | **1207454** | **28** | **11698240** | **30** |
| EI; Retired | 1280 | 16 | 16939 | 18 | 609778 | 14 | 5320691 | 14 |
| EI; Student (including FT Students) | 269 | 3 | 2835 | 3 | 196147 | 5 | 2255831 | 6 |
| EI; Looking After Home or Family | 308 | 4 | 3987 | 4 | 190552 | 4 | 1695134 | 4 |
| EI; Long-Term Sick or Disabled | 255 | 3 | 3288 | 3 | 133500 | 3 | 1574134 | 4 |
| EI; Other | 102 | 1 | 2098 | 2 | 77477 | 2 | 852450 | 2 |

Table 4.6 overleaf illustrates the 2011 economic activity and inactivity percentages for usual residents aged 16 to 74 in Attleborough and compares these to the statistics from the 2001 census. The table illustrates that the percentages for both 2001 and 2011 have remained relatively similar, with the number of economically active residents increasing slightly from 70% in 2001 to 72% in 2011.

**Table 4.6 – Comparison of 2001 and 2011 Economic Activity Statistics**

| Economic Activity | Attleborough | | | |
|---|---|---|---|---|
| | 2001 | % | 2011 | % |
| All Usual Residents Aged 16 to 74 | 7,219 | | 8,020 | |
| Economic Activity (EA); Total | 5,078 | 70 | 5,806 | 72 |
| EA; Employee; Part-Time | 1,005 | 14 | 1,203 | 15 |
| EA; Employee; Full-Time | 3,221 | 45 | 3,442 | 43 |
| EA; Self-Employed with Employees; Part-Time | 24 | 0 | 17 | 0 |
| EA; Self-Employed with Employees; Full-Time | 151 | 2 | 132 | 2 |
| EA; Self-Employed Without Employees; Part-Time | 104 | 1 | 164 | 2 |
| EA; Self-Employed Without Employees; Full-Time | 296 | 4 | 423 | 5 |
| EA; Unemployed | 168 | 2 | 233 | 3 |
| EA; Full-Time Student | 109 | 2 | 192 | 2 |
| Economic Inactivity (EI); Total | 2,141 | 30 | 2,214 | 28 |
| EI; Retired | 1,115 | 15 | 1,280 | 16 |
| EI; Student (including Full-Time Students) | 179 | 2 | 269 | 3 |
| EI; Looking After Home or Family | 432 | 6 | 308 | 4 |
| EI; Long-Term Sick or Disabled | 258 | 4 | 255 | 3 |
| EI; Other | 157 | 2 | 102 | 1 |

### *4.2.4 Accommodation Type – Households*

This section provides information that classifies accommodation type by the type of household. Table 4.7 overleaf compares the 2011 percentage of dwelling types for Attleborough with the 2001 statistics.

92% of the dwellings within the district are houses or bungalows; of this, 48% are detached, 29% are semi-detached and 15% are terraced; these figures are similar to those from 2001. The percentages of shared dwellings as well as the number of caravans or other mobile structures are imperceptible within the district.

**Table 4.7 - Comparison of 2001 and 2011 Accommodation Type Statistics (Households)**

| Accommodation Type - Households | Attleborough | | | |
|---|---|---|---|---|
| | 2001 | % | 2011 | % |
| All Households | 4,504 | | 4,760 | |
| Unshared Dwelling (UD); Total | 4,504 | 100 | 4,753 | 100 |
| UD; Whole House or Bungalow; Total | 4,120 | 91 | 4,390 | 92 |
| UD; Whole House or Bungalow; Detached | 2,111 | 47 | 2,299 | 48 |
| UD; Whole House or Bungalow; Semi-Detached | 1,344 | 30 | 1,374 | 29 |
| UD; Whole House or Bungalow; Terraced (Inc End-Terrace) | 665 | 15 | 717 | 15 |
| UD; Flat, Maisonette or Apartment; Total | 354 | 8 | 344 | 7 |
| UD; Flat, Maisonette or Apartment; Purpose-Built Block of Flats or Tenement | 243 | 5 | 267 | 6 |
| UD; Flat, Maisonette or Apartment; Part of a Converted or Shared House (Inc Bed-Sits) | 62 | 1 | 34 | 1 |
| UD; Flat, Maisonette or Apartment; In Commercial Building | 49 | 1 | 43 | 1 |
| UD; Caravan or Other Mobile or Temporary Structure | 30 | 1 | 19 | 0 |
| Shared Dwelling | 0 | 0 | 7 | 0 |

### *4.2.5 Accommodation Type – People*

This section provides information that classifies accommodation type by people. Table 4.8 below compares the 2011 percentage of dwelling types for Attleborough with the 2001 statistics. Household residents are counted and classified by the type of dwelling – shared or unshared and the type of accommodation that their household occupies.

**Table 4.8 - Comparison of 2001 and 2011 Accommodation Type Statistics (People)**

| Accommodation Type - People | Attleborough | | | |
|---|---|---|---|---|
| | 2001 | % | 2011 | % |
| All Households | 10116 | | 11100 | |
| Unshared Dwelling (UD); Total | 10116 | 100 | 11093 | 100 |
| UD; Whole House or Bungalow; Total | 9607 | 95 | 10505 | 95 |
| UD; Whole House or Bungalow; Detached | 5098 | 50 | 5589 | 50 |
| UD; Whole House or Bungalow; Semi-Detached | 3096 | 31 | 3318 | 30 |
| UD; Whole House or Bungalow; Terraced (Inc End-Terrace) | 1413 | 14 | 1598 | 14 |
| UD; Flat, Maisonette or Apartment; Total | 455 | 4 | 553 | 5 |
| UD; Flat, Maisonette or Apartment; Purpose-Built Block of Flats or Tenement | 299 | 3 | 395 | 4 |
| UD; Flat, Maisonette or Apartment; Part of a Converted or Shared House (Inc Bed-Sits) | 77 | 1 | 71 | 1 |
| UD; Flat, Maisonette or Apartment; In Commercial Building | 79 | 1 | 87 | 1 |
| UD; Caravan or Other Mobile or Temporary Structure | 54 | 1 | 35 | 0 |
| Shared Dwelling | 0 | 0 | 7 | 0 |

95% of the population of Attleborough, which is equal to 10,505 people, live in a house or bungalow. 5% of the people in Attleborough live in an unshared flat, maisonette or apartment;

which is significantly lower than the England equivalent of approximately 16%, or 11% in the East of England.

## 4.3 Active Travel (Walking and Cycling)

Active travel is an increasingly important consideration when developing any kind of transport strategy, particularly when in relation to a town centre where there can often be a heady mix of traffic and vulnerable road users. Attleborough town centre contains many conflict points between the more vulnerable user groups such as pedestrians and cyclists, and vehicular traffic.

### *4.3.1 Walking Networks*

Walking forms the most important mode of transport; it can replace short journeys by car and provides the means of connecting people to other modes of transport. The topography of the town centre and surrounding areas is ideal for journeys on foot. The relatively small size of the town means journeys from within Attleborough to the town centre are short and generally no greater than a mile. The road network within the town provides direct routes on foot throughout both residential and town centre locations with areas on the periphery of the town being no more than a 40 minute walk from the centre.

The town benefits from pedestrian footpaths adjacent to all roads in both the town centre and in residential areas. Footpaths in residential areas benefit from the correct dropped kerbs and are generally greater than 1.8m in width ensuring they are DDA compliant. Trip hazards are present but are not widespread and are typically where dropped kerbs have been incorrectly installed or damage to the highway has occurred. The low volumes of vehicles on residential streets and good forward visibilities throughout the town's residential areas provide a pleasant environment for journeys on foot.

The historical character of the town centre and the limited space around the traffic gyratory results in a small number of narrow footways which can leave pedestrians feeling vulnerable and having to give way to other pedestrians. Pedestrian crossings are located at convenient points within the town centre and journeys on foot can be made with ease from both public transport and car parks. Finger post signs are located throughout the town centre and peripheries highlighting main walking routes.

### *4.3.2 Pedestrian Desire Lines*

Journeys on foot can be made with ease through the residential areas with several off highway footways located throughout the residential areas. The desire lines for pedestrians would therefore follow the B1077 as it dissects the town providing the most direct route to the town centre.

Within the town centre, desire lines follow footways along High Street, Exchange Street and Church Street. High footfalls on footways either side of the aforementioned roads were observed during site visits. Key amenities and services such as the Post Office, superstore and various shops are located in this area and so links between them are important for pedestrians. The town centre car park and on street parking further cement the importance of the desire lines along the footways of Exchange and Church Street, providing links for shoppers from their vehicles.

Site visits identified pedestrians on Surrogate Street were accessing the town centre via the path through the church yard, from residential areas to the south east of the town centre. Despite its narrow width, pedestrian movements on Connaught Road favoured the southern footway, possibly due to it providing a direct desire line between the crossing point on High Street and Station Road. Given the location of the train station, Station Road forms a key desire line for journeys to and from the town centre and industrial units to the south of the station.

Pedestrian movements from south of the train line are facilitated by three level crossings but currently serve just a few residential dwellings and the Maurice Gaymer employment site. The Scott Wilson Master Plan identified that the proposed growth of Attleborough would increase the importance of the pedestrian crossing points both east and west of the town. These routes would provide a more direct journey on foot than the crossing point on Station Road and so would become important desire lines for pedestrians.

### *4.3.3 Crossing Points*

Three pelican crossings are located within the town centre and serve pedestrian desire lines. Figure 4.1 below shows the pelican crossing outside the Post Office on High Street, a crossing which was observed to be well used due to its location on a key pedestrian desire line.

**Figure 4.1 - Pelican crossing adjacent to the Post Office on High Street**

The pelican crossing on Exchange Street was also observed to be well used and provided a good link between the shops at the heart of the town centre. Pedestrian guard rail dominates the Exchange Street crossing which given the volume of traffic and vehicle types promotes pedestrian safety. The pelican crossing adjacent to the High School provides a key crossing point for pupils and parents across the B1077 Norwich Road promoting journeys on foot; as illustrated in Figure 4.2 overleaf.

**Figure 4.2 - Pelican crossings on both Church Street and Norwich Road outside the High School**

Uncontrolled crossing points with build outs are installed on Exchange Street and at the junction of Queen's Road / Exchange Street as shown in Figure 4.3 below. These are complemented with kerbed build outs of the footway, bollards and markings stating "Look right/left". Observations suggest these facilities have a good success rate and ensure drivers are more willing to allow pedestrians to cross.

**Figure 4.3 - Uncontrolled Crossing Points Located on Pedestrian Build outs with Associated Bollards**


A pedestrian refuge island facility is present at the junction of Exchange Street and Queen's Road surrounding the town's war memorial, shown in Figure 4.4 overleaf. The facility utilises the uncontrolled crossing facilities aiding pedestrian movements across a wide road space. Tactile paving and dropped kerbs complement the crossing but appear to be damaged in places as well as missing from a small section of the refuge. The facility provides a good link over a wide road space, but due to the limited visibility for drivers, can cause confusion.

**Figure 4.4 - Pedestrian Islands Located at the Junction of Exchange Street / Queen's Road / Church Street**

### *4.3.4 Footways*

Residential areas surrounding the town centre benefit from good quality footways which are of a DDA compliant width greater than 1.8m, as too are the vast majority of footways within the town centre. Footways throughout the town are of a good quality and there are few trip hazards. Certain points within the town centre have narrow footways with below the suggested minimum width. Whilst these are of sufficient width to walk upon safely, they could leave more vulnerable road users or persons with limited movement feeling vulnerable. The northern footway at the eastern end of Church Street, the northern footway at the western end of Connaught Road and a short stretch of the western footway on Surrogate Street are examples of this; as illustrated in Figure 4.5 below.

**Figure 4.5 - Narrow Pedestrian Footways on both Church Street and Surrogate Street**

The pedestrian footway crossing the church yard is of a loose material construction but is level and provides a pleasant alternative route for pedestrians. The swing gate at the Surrogate Street entrance does limit movements for persons with reduced mobility and push chairs but footways on alternative routes are of sufficient quality.

Within the town centre there are no off highway paths apart from a small cut through connecting the main Queen's Square Car Park with main shopping area on Church Street. The path is of sufficient width, but is not lit and does not have a flush kerb into the car park.

The pedestrian guard rail at the junction of Exchange Street / Connaught Road / High Street provides an important safety feature for pedestrians by providing a barrier between traffic and pedestrians and preventing HGVs from over running the footways.

The Taylor Wimpey Transport Assessment includes pedestrian counts at the High Street / Connaught Road junction undertaken on Wednesday 28th January 2010. A summary of the results is provided in Table 4.9 below and indicates that the highest pedestrian flows at this junction occur on the north side of High Street with 298 pedestrians recorded between 0700 and 1000 and 160 recorded between 1600 and 1900.

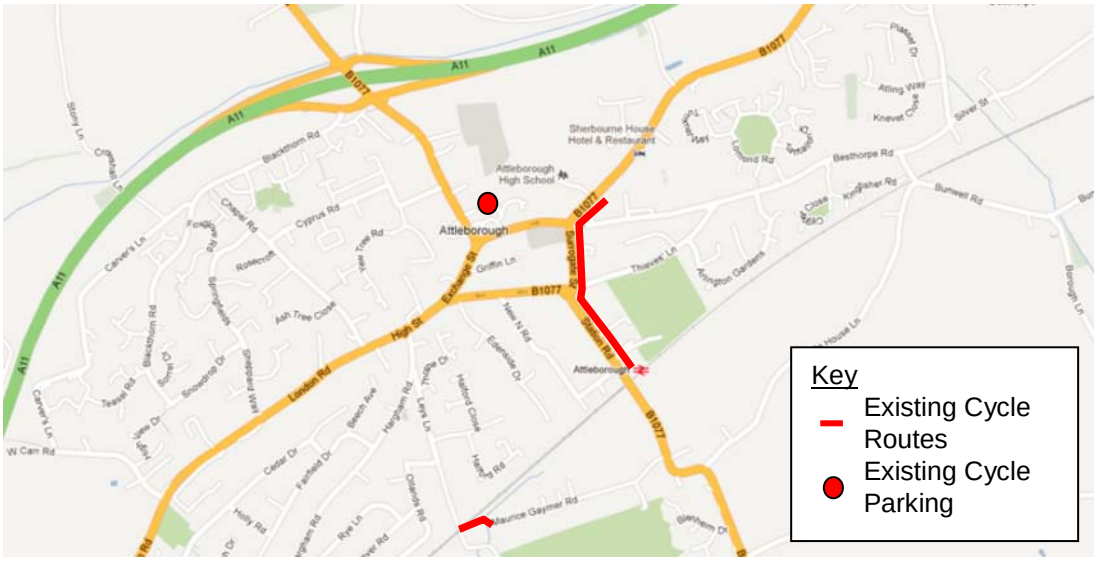
**Table 4.9 – Pedestrian Count Summary at High Street / Connaught Road**

| Movement | 0700-1000 | 1600-1900 |
|---|---|---|
| Crossing High Street Southbound | 35 | 51 |
| Crossing High Street Northbound | 91 | 31 |
| Crossing Connaught Road Southbound | 19 | 31 |
| Crossing Connaught Road Northbound | 34 | 25 |
| High Street (north side) ahead to Exchange Street | 211 | 53 |
| High Street (north side) from Exchange Street | 87 | 107 |
| High Street (south side) ahead to Connaught Road | 49 | 34 |
| High Street (south side) ahead from Connaught Road | 28 | 60 |

### *4.3.5 Cycling*

Two formal cycle lanes have been identified within the town connecting the high school with the train station and the industrial estate with the Leys Lane railway pedestrian crossing point as shown in Figure 4.6 below.

**Figure 4.6 - Cycle Lanes and Parking within Attleborough**




The Surrogate Street / Station Road cycle lane provides a good direct link for journeys by bike from the train station to the high school and could link with journeys further south of the town for more confident cyclists who would cycle on street using the B1077 Station Road. The short cycle lane connecting Maurice Gaymer Road with the pedestrian level crossing over the railway is well lit, of a suitable standard and provides an important link between Leys Lane and the industrial estate enabling journeys by bike from the North West of the town.

### *4.3.6 Cycling Desire Lines*

To the north of the train line the desire lines congregate on the town centre from the surrounding residential dwellings through the minor road network. It is possible to gain access to the town centre and gyratory via the minor road network which is encouraging for less confident cyclists, but journeys by bike crossing the town have to use the main roads of the gyratory.

Due to the constraints of the train line, desire lines from and to the south of the railway follow the two main crossing points of the railway line on the B1077 Station Road and Leys Lane pedestrian crossing point.

Should new development to the south of the railway progress, the existing desire lines north of the train line will remain as existing but with an increase in demand from the peripheries of the town, further increasing the importance of road safety on the minor road network and London Road. Most of the development will occur south of the train line to the east and west of the B1077 Station Road, increasing the importance of the crossing points on the train line. This is especially true for the Leys Lane crossing point which would be an attractive route for cyclists accessing the town centre avoiding main roads and the level crossing. The crossing point of Bunwell Road would become an important desire line for cyclists accessing both the town centre and the High School wishing to avoid the B1077 Station Road.

## 4.4 School Travel

There are a number of schools located within Attleborough which contribute to congestion in the morning and evening peaks. These include:

- Attleborough High School and Sixth Form Centre (965 pupils, 11-18yrs)
- Attleborough Junior School (350 pupils, 8-11yrs)
- Attleborough Infant School.(303 pupils, 4-7yrs)
- Rocklands Community Primary School (68 pupils, 4-8yrs)
- Chapel Road Special Needs School (57 pupils, 3-19yrs)[2]

Feedback from previous consultations with the public and local stakeholders, has highlighted the issue of school traffic causing a number of problems for the operation of the local highway network during pick up and drop off times associated with the schools. Concerns have also been raised regarding the location and arrangements for picking up and dropping off students in the immediate vicinity of the schools which can create blockages in the flow of traffic. This reduces the potential capacity of the network and can also lead to other road users taking alternative routing decisions to avoid these locations causing a knock on effect on the wider network.

## 4.5 Public Transport

In order to develop a comprehensive transport strategy for the town centre it is necessary to look at all forms of transport within the area. A review of existing issues relating to public transport within Attleborough including the town centre are presented in the report, Attleborough Smarter Choices Final Report, Capita Symonds, November 2012. This related Attleborough Town Centre Transport Strategy report will consider public transport issues relating to passenger facilities and public transport services within the town centre but does not address

[2] http://www.esinet.norfolk.gov.uk/ (2013 figures)

issues relating to wider public transport services which are adequately covered within the Smarter Choices Report.

### 4.5.1 *Rail Passenger Facilities*

Attleborough rail station is used by 171,000 passengers per year (based on 2011/12 boarding/alighting data)[3] which is almost 470 passengers per day on average. It is served by local services operated by East Midlands Trains on the Breckland Line from Norwich to Peterborough and Cambridge.

**Figure 4.7 – Attleborough Rail Station**

There are very limited passenger facilities with no means of purchasing a ticket at the station, no CCTV in operation and no waiting room. There are sheltered seating areas and access to the platforms is step free although there are no staff on hand to advise or assist. Help points are however available from both platforms and some limited cycle storage provision is available. More detailed information on access and facilities at Attleborough Rail Station are provided in the Attleborough Smarter Choices Final Report.

### 4.5.2 *Bus Passenger Facilities*

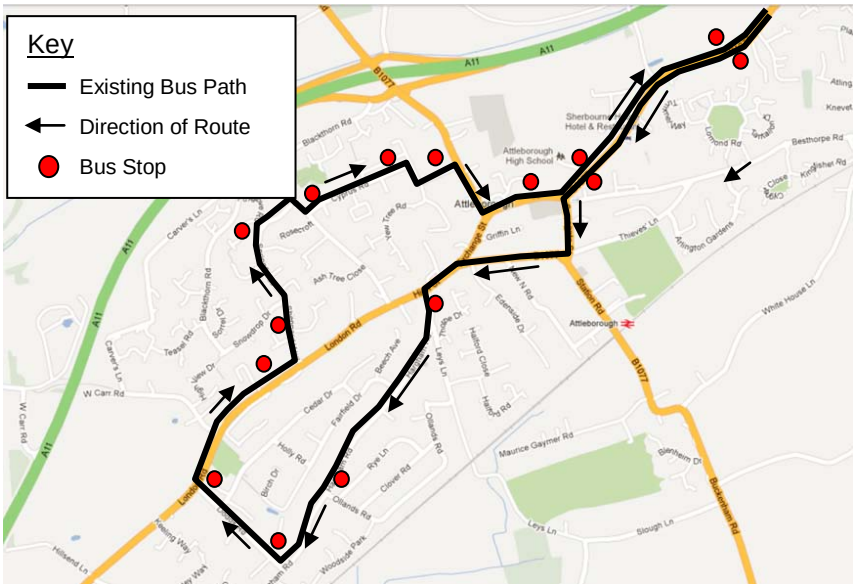
At present there are approximately 16 bus stops at various locations within Attleborough. The majority of stops do not benefit from timetable information or sheltered facilities. The St. Mary's Close bus stop and main bus stop in the town centre both benefit from displayed timetable information. The main town centre bus stop shelter is located away from the stop, although its location does allow both bus driver and passenger sight of each other. Observations during site visits suggest the shelter is of a sufficient size to meet current demand. However, whilst the shelter is decorated with local art work by children and could be considered to be sympathetic to its conservation area surroundings it is not the most pleasant of waiting areas.

### 4.5.3 *Bus Passenger Services*

Two separate operators currently provide services in Attleborough; both follow the one route which is identified in Figure 4.8 overleaf.

[3] http://www.rail-reg.gov.uk/ (2011-12 figures)

**Figure 4.8 – Existing Bus Stop Locations and Bus Service Route**




Approximately five separate services operate in the town; these are the 6A, 13, 13A, 13B and X6. They all follow a route which provides good coverage for residents north of the train line navigating through both the town centre and residential areas. The existing route ensures nearly all of Attleborough is within a 400m or 5 minute walk[4] of a bus stop.

The overall service provision is half hourly during day time hours and provides access to Norwich Bus Station. A National Express bus operates a service every two hours between Gatwick Airports South Terminal and the University of East Anglia from the main bus stop on Church Street in the town centre; as illustrated in Figure 4.9 below.

**Figure 4.9 – Church Street Bus Stop and Shelter**

[4] Based on 1.4m/s walking rate, taken from IHT Guidance Document 'Providing for Journeys on Foot'

### 4.5.4 *Discussion*

A review of previous transport and traffic studies relating to Attleborough identifies other bus services have operated in the past but have failed due to low patronages. The consultation exercise completed as part of the Issues and Options study suggests that bus infrequency, lateness, lack of waiting facilities and price all deter journeys by bus. The lack of services to other areas surrounding Attleborough such as Snetterton Heath could be a valid criticism of the bus services.

The forecast future growth within the town would increase the demand for bus services especially south of the train line. However, this area is at present poorly served with no bus services currently in operation. As such, there is also no link between rail and bus services. However, due to the lack of turning facilities and viable routes it is unlikely that a bus operator would run a service to the south of the gyratory.

Bus frequency has increased to two services an hour which is far better than the previous hourly service that serviced the town. Given the competition between the two operators punctuality of bus services have also improved.

## 4.6 Parking

### 4.6.1 *Off Street Parking Provision*

Attleborough currently has a number of public car parks within the town centre which are available for public use. In total there are approximately 235 off-street spaces available in public car parks as shown in Table 4.10 below. There are also approximately 420 parking spaces in private car parks; see Appendix F.

**Table 4.10 – Attleborough Car Park Provision**

| Name | Location | Spaces |
|---|---|---|
| **Public Car Parks in Town Centre** | | |
| Attleborough Station | B1077 Station Road | 38 |
| Edenside | Edenside Drive | 48 (2 DDA) |
| Queen's Square/Lloyds | Queen's Square | 100 (18 DDA) |
| Horse Pit | London Road / Chapel Road | 22 (1 DDA) |
| Church Street south | Church Street | 32 |
| Library | Behind Library | 10 |
| **Private Car Parks in Town Centre** | | |
| Lidl | Queen's Road | 90 (inc. 4 DDA and 20 Staff) |
| Sainsbury's | High Street | 170 (inc.6 DDA and 14 staff) |
| Connaught Hall | Station Road | 100 |
| Connaught Bowls Club | Station Road | 60 |

Attleborough has three other significant car parks that are private, two of which currently offer a limited period of free parking they are:

- Lidl – The supermarket has a car park of approximately 90 spaces and offers patrons 1 hour and 30 minutes of free parking. The car park is enforced by ANPR and is managed by Athena ANPR Ltd.

- Sainsbury's – The supermarket has an extensive car park offering approximately 170 spaces and offers patrons 2 hours free parking. The car park is also enforced by ANPR and managed by Euro Car Parks.

The other substantial car park is a private car park located at Connaught Hall which is available for hire for a range of activities and functions. Information has been received from Attleborough Town Council and Breckland District Council that the car park is also being used as a park and stride car park for Sainsbury's and NCC staff and possibly also as a commuter car park for those using Attleborough Rail Station.

### *4.6.2 Capita Symonds Parking Survey (June 2013)*

A survey was carried out on Thursday 13th June 2013 to assess the number of available car parking spaces within Attleborough town centre. Public car parks (Horse Pit, Edenside Drive, Queen's Square/Lloyds Pharmacy, Church Street south Lloyds TSB Bank), Attleborough train station and behind the library), private car parks (Sainsbury's, Lidl, Connaught Hall and Connaught Bowls Club) and on street parking (Exchange Square, Town Hall, Church Street and Connaught Road) were considered.

#### *4.6.2.1 Public Car Parks*

As can be seen in Table 4.11 below; at all times throughout the day, spaces were available in the public car parks except for between 09:00-11:00 when the Edenside Drive car park was full.

**Table 4.11 - Total Number of Available Parking Spaces in Public Car Parks**

| Car Park | Horse Pit | Edenside Drive | Queen's Square/ Lloyds | Church St south | Train St | Library |
|---|---|---|---|---|---|---|
| **Capacity** | **22** | **48** | **100** | **32** | **38** | **10** |
| **07:00** | 13 | 27 | 41 | 30 | 20 | 10 |
| **08:00** | 11 | 13 | 33 | 29 | 12 | 10 |
| **09:00** | 7 | 2 | 12 | 15 | 10 | 6 |
| **10:00** | 7 | 0 | 9 | 7 | 10 | 6 |
| **11:00** | 4 | 1 | 9 | 13 | 9 | 6 |
| **12:00** | 2 | 1 | 12 | 12 | 9 | 6 |
| **13:00** | 6 | 3 | 22 | 19 | 10 | 6 |
| **14:00** | 8 | 9 | 21 | 20 | 10 | 7 |
| **15:00** | 7 | 5 | 9 | 14 | 12 | 9 |
| **16:00** | 7 | 11 | 46 | 26 | 12 | 9 |
| **17:00** | 15 | 11 | 63 | 31 | 16 | 10 |
| **18:00** | 17 | 13 | 58 | 32 | 26 | 10 |

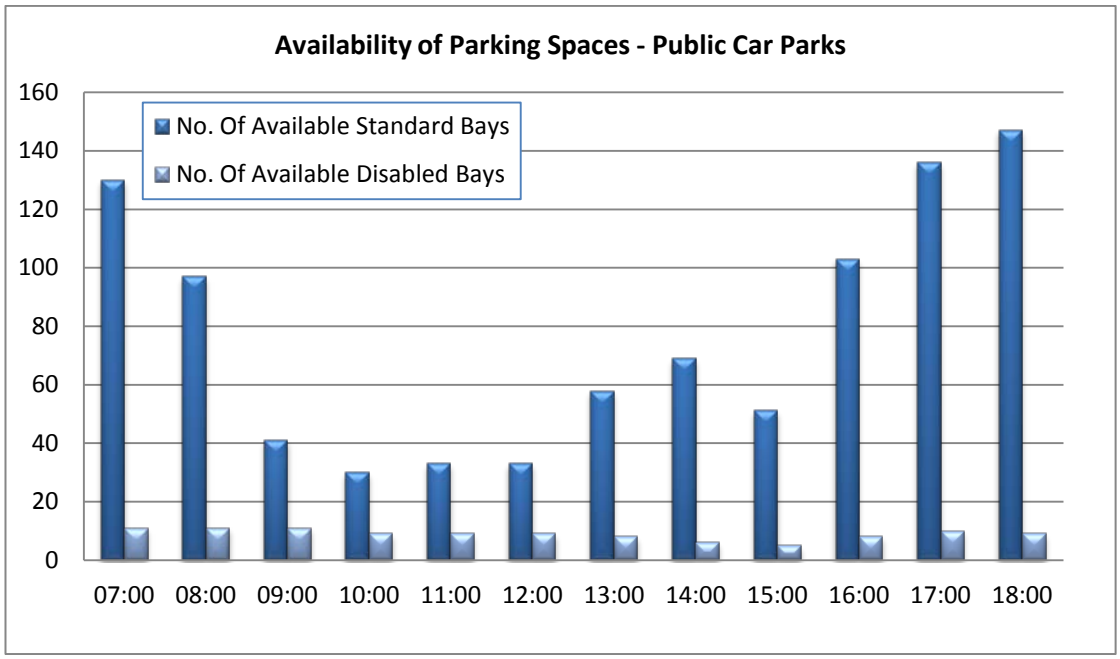
As can be seen in Table 4.12 overleaf; the average number of spaces available throughout the day was 86 (37%).

**Table 4.12 - Total Number of Available Parking Spaces in Public Car Parks**

| Total Number of Available Parking Spaces in Public Car Parks | | | | |
|---|---|---|---|---|
| **Time Period** | **No. Of Available Standard Bays** | **No. Of Available Disabled Bays** | **Total Available Spaces** | **% Spaces Available** |
| **07:00** | 130 | 11 | 141 | 60 |
| **08:00** | 97 | 11 | 108 | 46 |
| **09:00** | 41 | 11 | 52 | 22 |
| **10:00** | 30 | 9 | 39 | 17 |
| **11:00** | 33 | 9 | 42 | 18 |
| **12:00** | 33 | 9 | 42 | 18 |
| **13:00** | 58 | 8 | 66 | 28 |
| **14:00** | 69 | 6 | 75 | 32 |
| **15:00** | 51 | 5 | 56 | 24 |
| **16:00** | 103 | 8 | 111 | 47 |
| **17:00** | 136 | 10 | 146 | 62 |
| **18:00** | 147 | 9 | 156 | 66 |

As illustrated in Figure 4.10 below, the public car parks were at their busiest between 9:00 and 12:00, with limited availability of public parking spaces available.

**Figure 4.10 - Total Number of Available Parking Spaces in Public Car Parks**




*4.6.2.2 Disabled Parking Provision*

There are currently 11 disabled parking spaces available at the Horse Pit, Edenside Drive and Queen's Square public car parks in total.

*4.6.2.3 Private Car Parks*

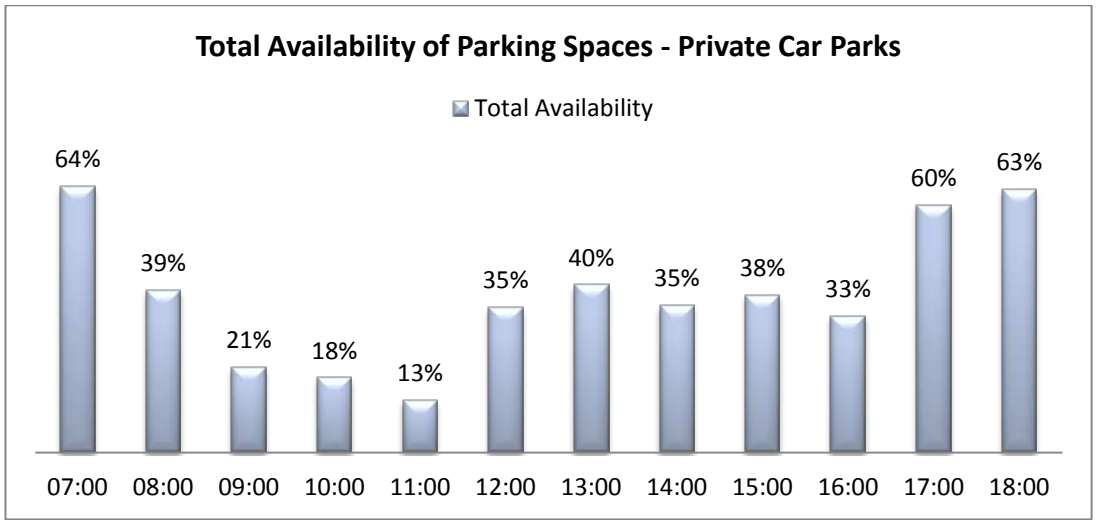
There are approximately 420 parking spaces available at the Sainsbury's, Lidl, Connaught Hall and Connaught Bowls Club private car parks. As illustrated in Table 4.13 and Figure 4.11 overleaf, the private car parks are also well used throughout the entire day, with the quieter

periods being either end of the day. Between 09:00 and 12:00 the Sainsbury's and Lidl car parks are nearing or are at capacity.

**Table 4.13 – Private Car Park Availability**

| Time Period | Sainsbury's | Lidl | Connaught Hall | Connaught Bowls Club | Total Availability |
|---|---|---|---|---|---|
| **07:00** | 95% | 80% | 80% | 2% | **64%** |
| **08:00** | 70% | 10% | 70% | 7% | **39%** |
| **09:00** | 5% | 2% | 60% | 15% | **21%** |
| **10:00** | 5% | 2% | 50% | 15% | **18%** |
| **11:00** | 0% | 0% | 30% | 20% | **13%** |
| **12:00** | 30% | 20% | 70% | 20% | **35%** |
| **13:00** | 30% | 20% | 80% | 32% | **40%** |
| **14:00** | 10% | 5% | 60% | 67% | **35%** |
| **15:00** | 10% | 5% | 70% | 67% | **38%** |
| **16:00** | 10% | 5% | 60% | 57% | **33%** |
| **17:00** | 75% | 40% | 80% | 43% | **60%** |
| **18:00** | 80% | 40% | 90% | 43% | **63%** |

**Figure 4.11 - Total Availability of Parking Spaces - Private Car Parks**




### *4.6.3 On street Parking*

As can be seen in Table 4.14 overleaf, there are approximately 50 on street parking spaces. Between 10:00-12:00 and 14:00-15:00 the majority of these on street parking spaces are in use.

**Table 4.14 - Availability of Parking Spaces - On Street Parking**

| Availability of Parking Spaces - On Street Parking | | | | | | |
|---|---|---|---|---|---|---|
| | **Exchange St** | **Town Hall** | **Church St 1st Section** | **Church St 2nd Section** | **Library Connaught Rd** | **Total** |
| **Capacity** | **7** | **13** | **5** | **17** | **8** | **50** |
| **07:00** | 6 | 5 | 4 | 14 | 8 | **37** |
| **08:00** | 1 | 6 | 2 | 12 | 8 | **29** |
| **09:00** | 1 | 3 | 0 | 5 | 4 | **13** |
| **10:00** | 1 | 1 | 1 | 0 | 1 | **4** |
| **11:00** | 2 | 0 | 0 | 1 | 0 | **3** |
| **12:00** | 2 | 1 | 0 | 1 | 7 | **11** |
| **13:00** | 2 | 1 | 1 | 4 | 6 | **14** |
| **14:00** | 0 | 2 | 0 | 0 | 5 | **7** |
| **15:00** | 1 | 3 | 1 | 1 | 7 | **13** |
| **16:00** | 3 | 0 | 0 | 7 | 5 | **15** |
| **17:00** | 4 | 0 | 4 | 6 | 8 | **22** |
| **18:00** | 3 | 0 | 0 | 7 | 8 | **18** |

### *4.6.4 Attleborough Town Centre Car Park Usage Study*

A study of Attleborough town centre car park usage was undertaken by the University of East Anglia (UEA) in 2009 the findings of which are presented in a PowerPoint presentation provided in Appendix LL.

The study was carried out to look at the numerous issues related to car parking in and around the town centre. A survey was carried out which sampled a cross-section of the population in the town centre, railway station and at Sainsbury's. The survey found that:

- The most common reason for being in Attleborough is for shopping (51%)
- 50%+ came from within Attleborough itself or the immediate surrounding area
- The majority travel to Attleborough daily or weekly
- 62% of people travelled by car
- The majority of people stayed less than an hour (45%)
- 46% parked at Sainsbury's, 27% at Queen's Square, 12% at the Rail Station, 7% at Lidl, 4% at Edenside, 2% on street and 2% at Horse Pit
- 43% of people prefer to park at Queen's Square and 25% at Sainsbury's
- 46% park all day, followed by 33% who park in the mornings only
- Well over 50% drive into Attleborough

There was significant agreement that:

- Car parking in Attleborough is currently difficult;
- Car parking will become worse in the future;
- Attleborough suffers from traffic congestion at many times throughout the day;
- Breckland District Council needs to urgently address the problem.

Some suggestions to address current parking included:

- The redesign of current car parks to maximise the utilisation of space resulting in an increase of spaces by 20%; however, the redesign would need to incorporate disabled spaces and be aware of any TPO's;
- Short/long stay car parks to make car parking spaces more readily available throughout the day;
- Car park signage to alleviate traffic congestion in the town centre by navigating people away from congested car parks and to available spaces;
- Improve/increase public transport to reduce traffic and car park congestion by increasing the use of public transport and in doing so reduce the requirement for parking spaces;
- Walking bus: to reduce traffic and car park congestion by walking to school instead of travelling by car;
- School drop off point to reduce car park and traffic congestion around Queen's Square Car Park at peak times;
- Healthy ad campaign to decrease the number of people who drive to the town centre by providing positive and motivational messages about the health benefits that can be obtained from becoming more physically active;
- Town centre car park expansion to create more town centre car parking spaces.

Whilst the Capita Symonds car park survey identified that parking provision within Attleborough is well used and can be close to capacity at certain times of the day, the car park usage survey undertaken by the University of the East Anglia (UEA) indicates that over half of people within Attleborough town centre are from within Attleborough itself or the immediate surrounding area.

The towns' car parks appear to be secure with very few concerns over car crime reported in the UEA survey or other consultation responses reviewed. The car parks also tend to be well located close to the retail core of Attleborough, are free of change and are generally well arranged for the convenience of users. Concerns have however been raised regarding the impact of future development on pressure for parking spaces within the town centre. 66% of respondents to the UEA surveys stated that parking in Attleborough was already 'difficult'.

### *4.6.5 Parking Charges*

Following a recent research and feasibility study into the introduction of parking charges on Council owned car parks throughout the Borough, Breckland Council decided against introducing parking charges. As such parking on Council owned car parks within the Borough including those within Attleborough town centre will continue to be free to use for the foreseeable future. This decision is likely to have been influenced by the weight of opposition from members of the public and local businesses who submitted a petition with over 10,000 signatures.

As parking pressures increase as a consequence of new development in Attleborough, it is likely that an appropriate parking strategy for the town will need to be developed. This may require the introduction of measures to discourage commuter parking to ensure more of the existing parking stock is available for short stay visitor parking. Such measures may include the introduction of enforcement such as that employed at the supermarket car parks whilst maintaining 'free' parking for short stay users; or the introduction of parking charges designed to discourage long stay car parking within the town centre. Either approach would need to be adequately enforced to ensure effectiveness. Any enforcement could be self financing through ticket receipts or fines received and as such could possibly be tendered out to a private operator.

## 4.7 Base Traffic Conditions

### *4.7.1 Local Highway Network*

Attleborough is situated on a number of transport corridors. The A11, which bypasses the town to the north, provides the strategic trunk road connection between Norwich, Cambridge, Stansted Airport, London and the A14 to the midlands. There are smaller B roads which link surrounding villages to Attleborough town centre

The town centre is compact, made up of historic roads, and is served by a one way system which forces traffic around the town centre regardless of their origin, destination or direction of travel. This acts to limit the route options available to traffic and results in time/difference penalties for some journeys. The one way system in operation utilises Connaught Road, Exchange Street, Church Street and Surrogate Street as illustrated in Figure 4.12 below.

**Figure 4.12 – Town Centre One-Way System**


Access to central retail areas as well as local schools is served by the one way system. This can become congested at peak times of the day principally where the radial routes intercept with the one way system. HGV movements on this system amplify this issue, as the only direct route available from the A11 to the industrial estate south of the town is through the town centre.

### 4.7.2 Local Highway Network

The Highways Agency data used for the POPE assessment of the A11 widening scheme was based on data collected over a 2 week period from 2nd March 2012 and provides the most comprehensive coverage of the Local Highway Network within Attleborough. The results from the analysis of the raw data are summarised in Table 4.15 overleaf which shows the total level of traffic using the route in both directions (where applicable) for the given time period. Annual average daily traffic (AADT) flows represents the average daily flow (7 days) whilst the annual average weekday traffic (AAWT) flows represent the average weekday traffic flows (5 days).

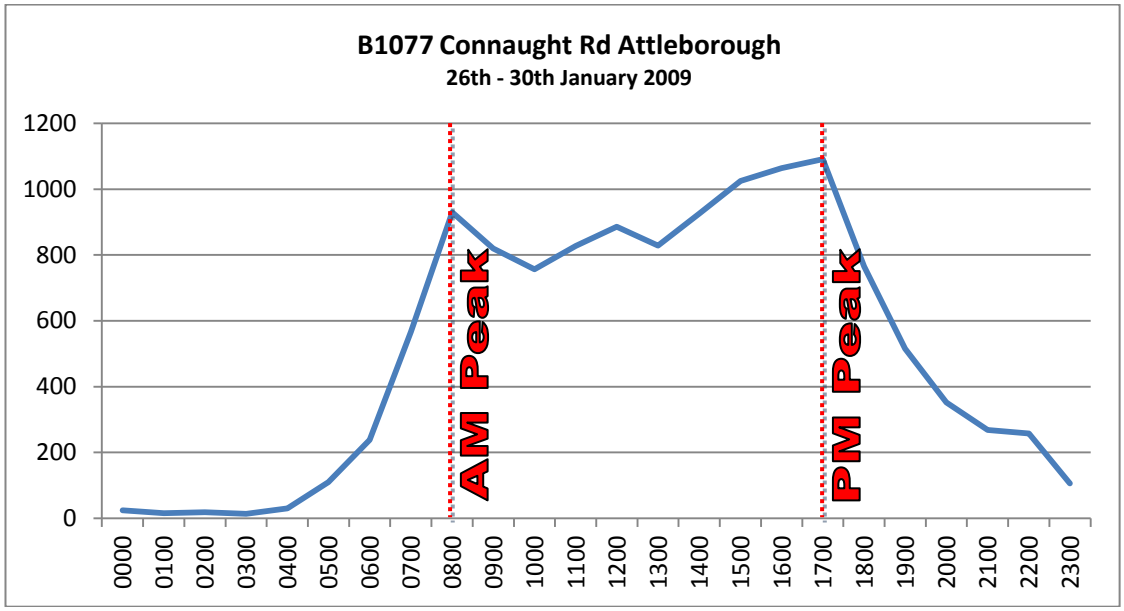
**Table 4.15 – Summary of Highways Agency 2012 ATC Link Count Data**

| Road | Location | AM (0800-0900) | PM (1600-1700) | AADT | AAWT |
|---|---|---|---|---|---|
| Norwich Road | A11 on slip- Attleborough EB | 251 | 185 | 2325 | 2510 |
| | Between Mill Lane and A11 off slip NB | 358 | 256 | 3080 | 3349 |
| | Between Mill Lane and A11 off slip SB | 399 | 408 | 4043 | 4455 |
| Deopham Road | North of A11 on slip NB | 30 | 28 | 315 | 347 |
| | North of A11 on slip SB | 33 | 28 | 317 | 347 |
| Mill Lane | North of Silver St NB | 144 | 83 | 941 | 1031 |
| | North of Silver St SB | 73 | 83 | 827 | 879 |
| Ellingham Road | South of Warrens Lane NB | 331 | 325 | 3026 | 3958 |
| | South of Warrens Lane SB | 457 | 328 | 3011 | 3941 |
| Queens Rd | Between A11 Slip Road & Queens Court NB | 366 | 401 | 4074 | 4489 |
| | Between A11 Slip Road & Queens Court SB | 364 | 296 | 3312 | 3647 |
| Silver St | East of White Horse Lane EB | 152 | 93 | 1007 | 1110 |
| | East of White Horse Lane WB | 84 | 94 | 904 | 971 |
| Station Rd | Between Connaught Rd & New North Rd NB | 323 | 442 | 4619 | 4075 |
| | Between Connaught Rd & New North Rd SB | 481 | 350 | 4975 | 4378 |
| West Carr Road | East of Long Street EB | 16 | 15 | 140 | 128 |
| | East of Long Street WB | 5 | 8 | 102 | 89 |
| Wroo Road | Between Swangey Lane & A11 NB | 56 | 57 | 634 | 571 |
| | Between Swangey Lane & A11 SB | 77 | 43 | 635 | 574 |
| B1077 London Rd | East of A11, West of Fen St EB | 180 | 203 | 2286 | 2111 |
| | East of A11, West of Fen St WB | 225 | 186 | 2523 | 2307 |

The figures in Table 4.15 above, along with more detailed analysis of the count data, show that there are definite peaks in the daily traffic flows with the 13 to 26% of average weekday traffic flows occurring during the AM and PM peak hours. Further details of the link count data are provided in Appendix I.

Unfortunately none of the HA surveys provided data for any of the links on the town centre one-way system. However data from a temporary ATC survey undertaken by Norfolk County Council in January 2009 provides data for the B1077 Connaught Road. Figure 4.13 overleaf illustrates the traffic flow profile on the one-way system and illustrates the AM and PM peaks.

**Figure 4.13 – Profile of Traffic Flows on B1077 Connaught Road Westbound (One-Way)**



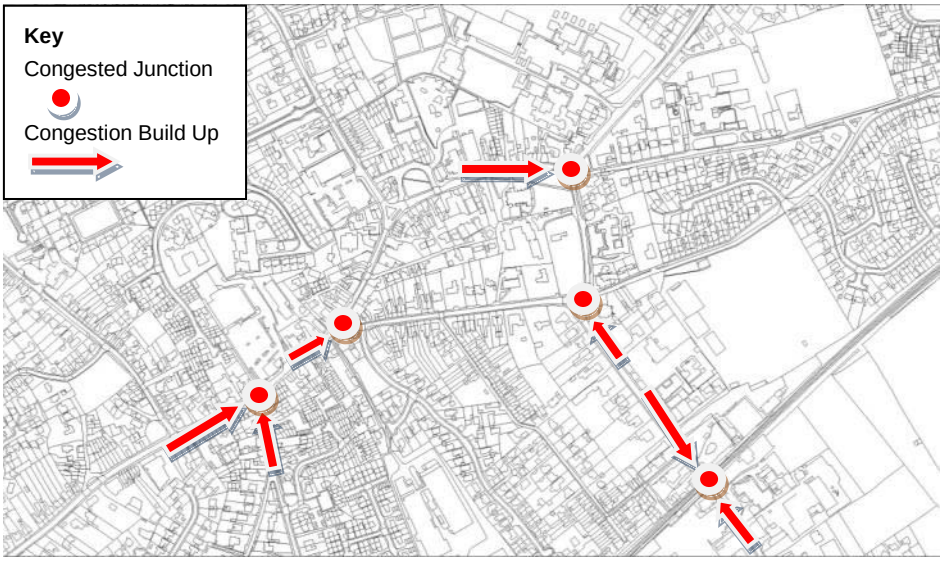

As can be seen in Figure 4.13 the AM peak tends to be for a shorter duration than the PM peak with lower traffic levels also experienced. The graph indicates that traffic flows are marginally higher for 17:00 to 18:00 than 16:00 to 17:00. However traffic flows for all three hours between 15:00 and 18:00 are higher than the AM peak which is likely to be as a consequence of staggered school and commuter peaks within the PM period.

### *4.7.3 Junction Delays*

Junctions can act as significant pinch points and this is no exception in Attleborough town centre. In the majority of cases congestion is caused by the lack of junction capacity rather than a lack of link capacity. Junction congestion has been observed at a number of junctions around Attleborough town centre with the worst affected junctions shown in Figure 4.14 overleaf.

The level crossing on Station Road is also known to cause congestion as this effectively stops traffic in both directions for the duration of the closure. The recent upgrade from manual to radar control has resulted in some time savings as demonstrated later in the report although average closures are still 2 to 3 minutes for each passing train. As there are no other vehicular links to the Maurice Gaymer and Bunn's Bank employment sites, Station Road can be subjected to heavy traffic flows, resulting in significant queues forming when the level crossing barrier is down.

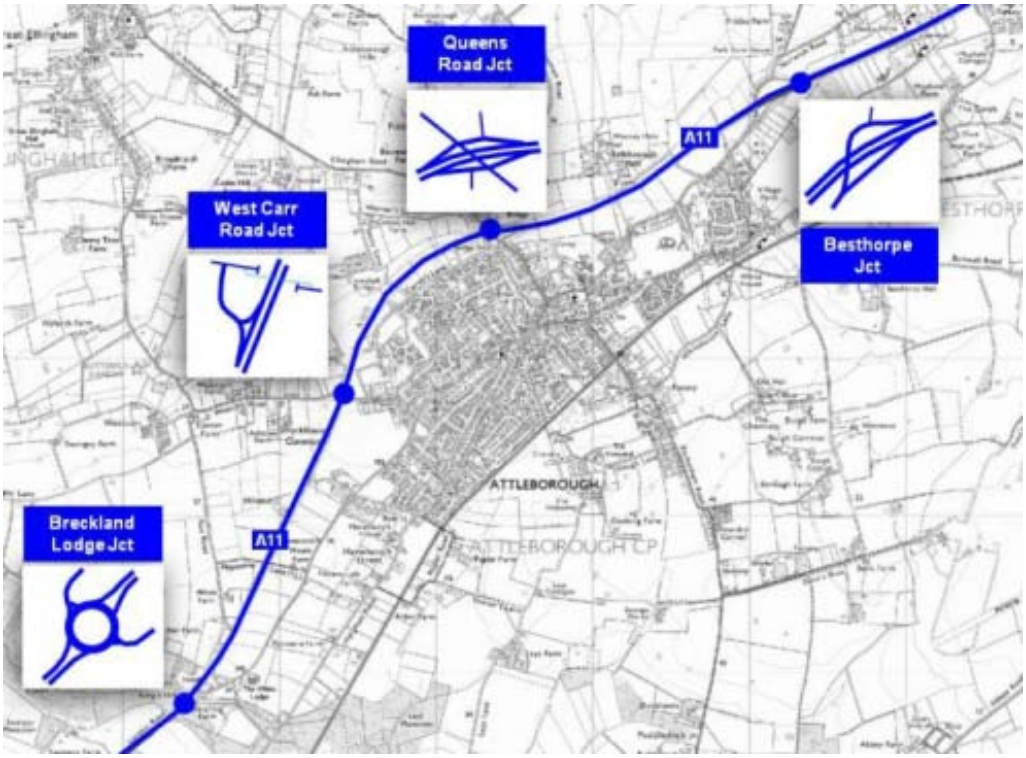
**Figure 4.14 – Location of Junction Congestion in Attleborough Town Centre**




### *4.7.4 Local Strategic Highway Network*

The A11 was duelled from Besthorpe Junction to the London Road Junction in 2007. This section of the A11 effectively bypasses Attleborough to the north with three strategic junctions providing access to the town as shown in Figure 4.15 below. The London Road Junction (Breckland Lodge junction) is provided as a roundabout. The Ellingham Road / Queen's Road Road Junction has been upgraded for access to both north and south bound travelling traffic. However, the Besthorpe Junction only provides for limited movements with north facing slips only.

**Figure 4.15 – A11 Junctions for Access to Attleborough**



POPE[5] comparisons of 'before scheme', 'one year after' and 'five year after' traffic flows in relation to the A11 widening project are illustrated in Figure 4.16 below.

**Figure 4.16 – Highways Agency A11 Widening POPE Assessment Traffic Flows**

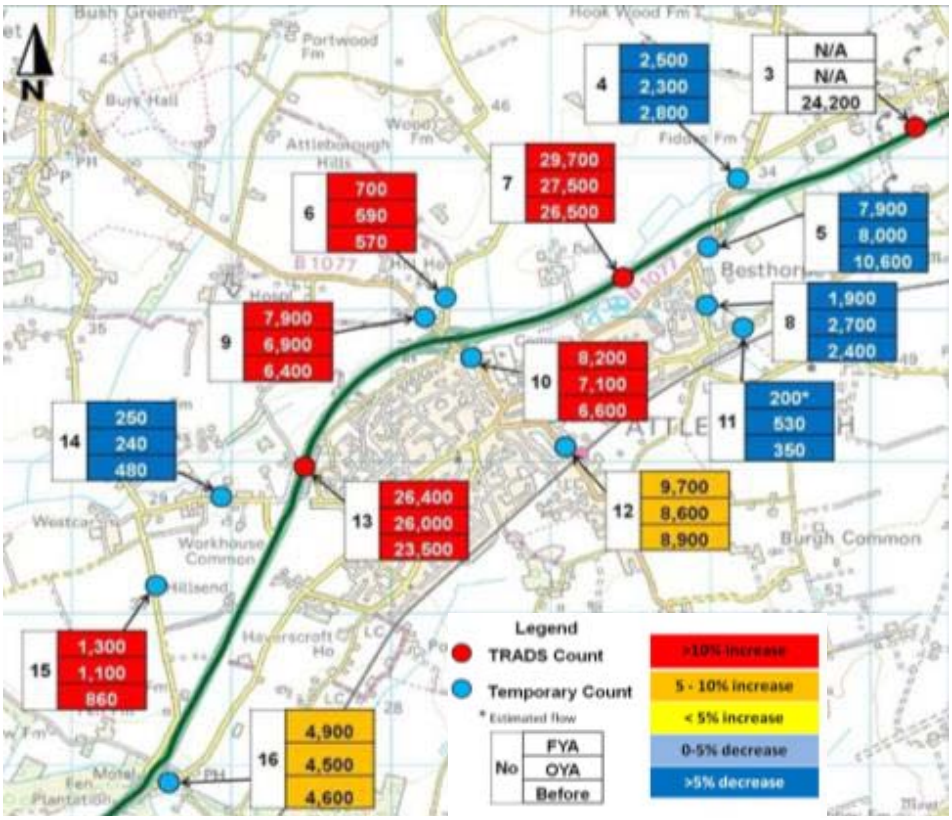



Figure 4.16 above illustrates how traffic flows on the local highway network have changed since 2006. Traffic flows have increased by 10% or more on the A11 and the approach roads to the A11 junctions with the B1077 Queens Road and London Road whilst traffic flow on local roads in Besthorpe have decreased by 5% or more.

## 4.8 Attleborough Level Crossing

The manually operated level crossing on Station Road to the south of Attleborough town centre (see Figure 4.17 overleaf) was replaced in December 2012 with automated barriers as part of a project by Network Rail. The upgrade has helped make the line more reliable, safer, and has reduced waiting times at the level crossing.

A level crossing survey was undertaken in December 2010 which recorded the duration of each closure and details on whether or not the barrier was opened between trains running close together. A simultaneous link count survey was also undertaken in this location; the results are shown in Table 4.16 overleaf and fully in Appendix G.

[5] POPE is Post Opening Project Evaluation

**Figure 4.17 – Attleborough Level Crossing before Upgrade**

On site observations and a review of consultation responses suggest that the manual level crossing on Station Road adjacent to Attleborough Rail Station was a source of much congestion within the town centre with queues blocking back from the level crossing reaching the one-way system which in turn, resulted in the town centre becoming gridlocked with traffic.

As can be seen in Table 4.16, below the queue of vehicles travelling southbound from the town centre towards the level crossing was on average 34 vehicles long or 203m; the longest southbound queue in the am peak was when the barrier was down for 6 minutes and 21 seconds at 08:54 and was 69 vehicles long which extended for 414m; this would have reached the town centre gyratory.

**Table 4.16 – Manually Operated Level Crossing Statistics**

| Manual | Longest Queue (nb) | Longest Queue (sb) | Average Queue (nb) | Average Queue (sb) |
|---|---|---|---|---|
| Vehicles | 74 (10:02) | 69 (08:54) | 28 | 34 |
| Metres | 444 | 414 | 167 | 203 |

The manual level crossing was replaced in December 2012 by an automatic crossing. A survey was undertaken on 5th March 2013 which recorded the duration of each level crossing closure. These results are compared to the manual results in Table 4.17 below.

As shown in Table 4.17 below the longest time the barrier is down has reduced from over 10 minutes to 3 minutes 20 seconds; this is a considerable reduction in time. In addition, the average time the barrier is down per day has halved.

**Table 4.17 – Comparison of Manually and Automatic Operated Level Crossing**

| Crossing Type | Longest time barrier is down | Shortest time barrier is down | Average time barrier is down (day) | Average time barrier is down (am peak) | Average time barrier is down (pm peak) |
|---|---|---|---|---|---|
| Manual | 10:14 | 02:19 | 04:35 | 05:19 | 03:27 |
| Automatic | 03:20 | 01:37 | 02:17 | 02:02 | 02:14 |

When trains pass through the level crossing at a similar time, the barrier occasionally remains down. Table 4.18 overleaf illustrates that the average length of time the barrier is down has reduced significantly with the use of the automatic barrier. The average time the manual barrier was down, was 6 minutes 26 seconds; this is compared to 3 minutes 19 seconds with the

automatic barrier. The number of times the barrier is left down has also reduced resulting in a more efficient use of the barrier.

**Table 4.18 – Average Time Barrier is down when Two Trains Pass**

| Crossing Type | Average time barrier is down when two trains pass |
|---|---|
| Manual | 06:26 |
| Automatic | 03:19 |

Since the manual level crossing was upgraded to automatic, the length of time the barrier is down has reduced significantly; this in turn reduces waiting times and therefore the number of vehicles queuing.

## 4.9 Accident Analysis

The following paragraphs provide an assessment of the reported road traffic accident history in Attleborough town centre in order to identify any significant highway safety issues. Reported road traffic accident data has been obtained from Norfolk County Council for the five year period from July 2007 to June 2012.

The location map of the recorded accidents is provided within Appendix J and covers the whole study area. Within the town centre area, the collision data indicates that 22 accidents have been recorded during the five year period, resulting in 24 casualties, of which 3 (13.6%) are serious and 19 (86.3%) are slight. No fatal accidents have been reported within Attleborough town centre in this period.

Vulnerable road users, such as pedestrians and motor cyclists, have been involved in all three of the serious accidents recorded. Of the 22 accidents which have been reported in the town centre, 10 (45.4%) accidents involved pedestrians, 2 (9.1%) cyclists and 4 (18.2%) motorcyclists.

A summary of the accident statistics are presented in Table 4.19 and Table 4.20 below.

**Table 4.19 - Summary of Reported Injury Accidents - Attleborough Town Centre**

| Severity | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total |
|---|---|---|---|---|---|---|---|
| Fatal | - | - | - | - | - | - | 0 |
| Serious | - | 1 | 1 | 1 | - | - | 3 |
| Slight | 2 | 4 | 2 | 7 | 3 | 1 | 19 |
| **Total** | **3** | **5** | **3** | **7** | **3** | **1** | **22** |

**Table 4.20 - Reported Road Casualties by Severity - Attleborough Town Centre**

| Severity | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total |
|---|---|---|---|---|---|---|---|
| Fatal | - | - | - | - | - | - | 0 |
| Serious | - | 1 | 1 | 1 | - | - | 3 |
| Slight | 2 | 4 | 3 | 7 | 4 | 1 | 21 |
| **Total** | **2** | **5** | **4** | **8** | **4** | **1** | **24** |

The recorded collisions have been considered on a link by link basis overleaf.

### 4.9.1 *High Street*

A total of four accidents have been recorded along High Street of which, three resulted in slight casualties and one serious. The serious injury involved a pedestrian as did one of the slight casualties. A cyclist was also involved in one of the accidents resulting in a slight casualty. The accidents recorded occurred during various times of the day and various weather conditions.

### 4.9.2 *Exchange Street*

Three accidents have been recorded on Exchange Street resulting in three slight casualties. One of these included a cyclist and occurred close to the junction of Church Street / Queen's Road junction. They all have occurred during daylight hours and although the weather conditions are stated as fine and dry in two of them, in the other one they are unknown.

### 4.9.3 *Church Street*

Five accidents have been recorded on Church Street resulting in five casualties slight in severity. Of the five accidents, two involved pedestrians, two motorcyclists and one involved only cars. All accidents occurred during various times of the day and in fine weather conditions.

### 4.9.4 *Norwich Road*

A single accident has been recorded on Norwich Road resulting in a slight casualty to a pedestrian. Fine weather conditions and dry surface were reported in the accident description.

### 4.9.5 *Surrogate Street*

A total of three accidents have been recorded on Surrogate Street resulting in four injuries. All of them slight in severity. One of these included a pedestrian and one a motorcyclist. The accidents occurred during various times of the day and all in fine weather conditions.

### 4.9.6 *Station Road*

Four accidents have been recorded on Station Road resulting in five casualties. Three accidents resulted on slight casualties and one serious. The serious casualty involved a pedestrian. The accidents occurred during various times of the day and during various weather conditions.

### 4.9.7 *Connaught Road*

A single accident has been recorded on Connaught Road resulting in a serious casualty involving a motorcyclist. The accident occurred as a result of driver error during daylight hours in fine weather conditions.

A further accident was also recorded at the junction of Connaught Road / Exchange Street and involved a light good vehicle and a pedestrian resulting in a slight casualty. The weather and surface are listed as fine and dry respectively.

### 4.9.8 *Summary*

The review of accident data for the five year period July 2007 to June 2012 shows that a high proportion of recorded accidents in Attleborough town centre involve pedestrians (45.5%). This is likely to be typical of town centres due to the high levels of pedestrian activity. Many of the accidents are attributed to driver error or pedestrians failing to look properly. There is no specific pattern of incidents that are attributed to the poor design of the highway within Attleborough town centre. No critical locations on the road network with significant accident records have been identified.

Four fatal accidents have occurred within the wider Attleborough area. One of these occurred on Hargham Road, 145 metres east of the train line. The other three fatal accidents occurred on the A11 approximately three kilometres northeast of Attleborough town centre and all within 1km of each other.

## 4.10 Constraints

In order to try and assess what the main contributory factors are to the current issues experienced within the town centre, a number of site visits and traffic surveys have been undertaken. The survey data has been compiled in such a way as to gain a picture of the traffic levels and movements at the busiest times of day, which could then be analysed to determine what factors are contributing to these issues. The recent Automatic Number Plate Registration (ANPR) surveys have shown that there are a high number of trips travelling through the town centre one-way system (75% matching on the inner cordon), without an origin or destination within the town centre.

During site visits undertaken on 4th and 5th September 2012 we were able to identify a number of constraints on the town centre network, examples of which are illustrated in Figure 4.18. These range from physical constraints imposed by buildings to on-street parking provisions (likely to be a lot of opposition to proposals to remove or revise).

**Figure 4.18 - Constraints Imposed by Existing Built Form (left) and Current On-street Parking Provision (right).**

Additionally there are constraints arising from the historical landmarks situated within intersections such as the war memorial at the Queen's Road / Church Street junction and the Obelisk (Crimean War Memorial) at the Connaught Road / Surrogate Street junction; see Figure 4.19 overleaf. A full list of listed buildings and structures within Attleborough is provided as Appendix K.

The requirements for access to side streets and for loading also limit the options available for future traffic management.

**Figure 4.19 - Attleborough War Memorial (left) and Loading/Unloading activity within the town centre, opposite the main bus stop facility (right).**

The current one-way system forces traffic around the town centre regardless of their origin, destination or direction of travel. Access to central retail areas as well as local schools is served by the one way system. Consequently the one way system experiences heavy traffic flows, particularly during peak periods to the detriment of the local environment and conditions for pedestrians and cyclists. HGV movements on this system amplify this issue, as the only direct route available to the south of the town is through the town centre.

Manual for Street 2 (MfS2), (CIHT, September 2010) states “In many towns and cities traffic management systems, often involving networks of one way streets, have been created. The usual aim of these systems is to increase network capacity by simplifying turning movements at junctions. These aims are understood, but the improvements in traffic flow capacity are offset in reductions in legibility and accessibility for all road users. One-way streets also tend to cause higher traffic speeds.”

MfS2 also suggests that cyclists are particularly disadvantaged by such systems, since the additional travel distance can be significant and that pedestrians can become disorientated by one-way streets, and fail to look for traffic in the correct direction before crossing.

The plans for future growth in Attleborough are also constrained by the limited number of vehicular crossing points of the Norwich – Cambridge rail line. As such, any future development to the south of the railway line is likely to be concentrated onto a single route unless additional rail crossings can be accommodated. There are also issues for non-car modes of transport, such as bus service reliability, and the need for improvements to walking and cycling infrastructure, which need to be addressed if the goal of encouraging more people to travel by non-car modes is to be achieved. This would also include the use of more sustainable car modes such as encouraging high occupancy vehicles, or use of private hire vehicles for infrequent users of cars as an alternative to owning a car for travel.

# 5. Planning Policy Framework and Consultation

## 5.1 Present Transport Policies

This section provides a brief synopsis of several documents reviewed to inform the baseline position with regards to existing conditions and the policy situation relating to transport in Attleborough town centre.

### *5.1.1 Norfolk's Third Local Transport Plan, 2011 - 2026*

Norfolk's third Local Transport Plan (LTP3), Connecting Norfolk has been adopted. This describes the county's strategy and policy framework for delivery up to 2026. It provides a guide for transport investment and is considered by other agencies when determining planning or delivery decisions.

Connecting Norfolk reflects the views of local people and stakeholders, identifying six priorities for transport as follows:

- Maintaining and managing the highway network
- Delivering sustainable growth
- Enhancing strategic connections
- Reducing emissions
- Improving road safety
- Improving accessibility

Connecting Norfolk provides a balanced strategy taking adequate regard of sustainability considerations, such as its impact on biodiversity, social exclusion, carbon emissions and health of the population. In this respect the vision for transport as defined by LTP3 is to provide 'a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county'.

It is envisaged that this vision will be achieved by:

- Making the best use of what we have to facilitate reliable journeys
- Reducing the need to travel
- Influencing others and ensuring transport is integrated into development plans
- Working with communities and our partners to seek new solutions and new ways of delivering
- Lobbying for and pursuing improvements to Norfolk's strategic transport network.

It is recognised that investment in new infrastructure will be focused on a small number of strategic improvements linked to major housing or economic growth and strategic connections. Otherwise, the focus of short to medium term investment is likely to be maintaining the existing highway in order for Norfolk County Council to meet their statutory obligations as a highway authority.

The location and quantity of growth in housing and jobs over the next 20 to 30 years will be set out in district councils' Local Development Frameworks, which are in various stages of development. A number of settlements including Attleborough will see significant housing growth.

### *5.1.2 Connecting Norfolk: Implementation Plan for 2011-2015*

This implementation plan provides information on the delivery of *Connecting Norfolk* over 2011-15. The plan states that emphasis for delivering sustainable growth will be on influencing the location of new development through the planning process to ensure that it is well located in settlements with a range of services. It identifies Attleborough as an area which will see significant growth.

By working with the district councils, Norfolk County Council will identify the necessary transport infrastructure to meet the transport priorities and promote economic growth. Area specific implementation plans for transport will be developed where necessary. This will include development of a Community Infrastructure Levy, to aid the financing of infrastructure. Priority will be to secure improvements that enhance public transport, walking and cycling access to employment and key services.

Travel plans for new developments will continue to be secured. Over the next four years Norfolk County Council's aim is to move towards a self-sustaining model of travel planning; one that does not require continued investment from the public sector. All travel plans agreed through the development control process will be bonded, which places an obligation on the developer to undertake any measures agreed.

### *5.1.3 Mott Macdonald's Attleborough Land Use and Transportation Study 2008*

The study analyses the transport situation in Attleborough and provides a strategy for enhancing accessibility and addressing the transport implications of future growth. A large number of stakeholders were consulted to inform the formulation of the report which culminates in the provision of an action plan and associated policy recommendations.

The interactions with stakeholders have provided detailed information of where transportation investment or improvements may be required and directly inform the action plan. The action plan recommends areas where consideration should be given in the form of policies for the short, medium and long term. These time periods coincide with the Breckland Local Development Framework.

### *5.1.4 Post Opening Project Evaluation, One Year after Study - A11 Attleborough Bypass Improvements*

This report evaluates the impact of the A11 Attleborough bypass widening scheme one year after completion. The report indicates that the actual flows on the B1077 were 25% higher than forecasted although the economic evaluation gives the scheme a BCR ranging between 5.2 and 7.9. This shows the scheme is highly beneficial in economic terms. The impact in terms of traffic flows on the local highway network is reflected in Figure 3.18 which shows traffic flows for one year before, one year after and five years after scheme opening. The 'Five Years After' study is yet to be produced.

### *5.1.5 Mott Macdonalds Attleborough Proposed Link Road Solutions, Route Identification Study*

The study examined four possible options for a link road over the railway to service land to the south of the town whilst providing a direct route from Bunns Bank to the A11 avoiding the need to congest the town centre. The study concludes that a link road to serve a sustainable urban extension to the south of Attleborough is technically deliverable. All four link road options

examined can be engineered to a standard acceptable to the Highways Authority and Network Rail and are viable.

### *5.1.6 Other National Initiatives*

The Traffic Management Act received Royal Assent in July 2004, and has some far reaching implications for network managers, including Local Authorities. The intention of the Act is to try and secure the expeditious movement of vehicles on their network and the network of surrounding authorities. The remit of the Act covers all forms of transport including non-motorised users. It is also an important requirement of the Act for network managers to be able to illustrate that the policies and schemes that have been implemented are having a beneficial effect on the expeditious movement of vehicles.

## 5.2 Present Problems on the Transport System

### *5.2.1 Issues and Options Consultation*

In 2010/11, Breckland Council undertook a consultation on the Attleborough and Snetterton Heath Local Plan (Local Plan) Issues and Options. Young people, the general public and stakeholders were asked for their comments on the plan.

5.2.1.1 Town Centre

- The results show there is a varied opinion on the town centre and improvements.
- The consultation established that the Consultees consider that there is a need for the town centre gyratory to be reassessed and revisited to reduce the dominance of vehicular movements through the town centre and therefore reduce congestion.
- They also identified that the existing gyratory system will constrain growth.

5.2.1.2 Cycling

- To encourage more people to cycle, it was suggested that improved cycle parking infrastructure is needed, for instance, cycle lanes and secure cycle parking.

5.2.1.3 Car Parking

- Many respondents indicated that the quantity of car parking is sufficient but also expressed concerns about how parking is operated and where it is located.
- It is envisaged that a suite of measures will be required to address the transport issues in and around Attleborough ranging from improvements and changes to the highway network to measures which promote modal shift.

5.2.1.4 Bus / Rail Integration

- Consultees gave mixed opinions on whether investigation should be made into the potential for improving Attleborough Rail Station into a single site including bus service facilities.
- There is general support for improving bus services between Snetterton Heath and Attleborough and also suggestions for links to further afield, for example Thetford.

5.2.1.5 Relief Road

- Opinion is divided about a relief road with concerns raised over route and cost. However, support is shown with the need to relieve the town centre of congestion, and HGV movements.

### *5.2.2 Young Person's Questionnaire*

The young person's questionnaire identified that cheaper bus fares would encourage people to use public transport. Also, the quality of buses and bus stops are an issue and could be improved as well as more frequent and reliable bus services, along with more bus stops and better permeation of the service within Attleborough and surrounding towns.

The consultation exercise completed as part of the Issues and Options study suggests that bus infrequency, unreliability, lack of waiting facilities and price all deter journeys by bus. The lack of

services to other areas surrounding Attleborough such as Snetterton Heath was a criticism of the bus services.

### *5.2.3 Transport Forum*

In order to support the development aspirations for the town, all partners agree that an efficient transport system, especially in the town centre, is essential. There are many issues affecting the transport network of Attleborough town centre and in particular the current one-way system in operation through the town centre. There were a number of comments made at the 2010 Issues and Options consultation relating to existing transport problems. A Transport Forum held in 2012 also established that the community considers the capacity and flow of traffic on the town centre gyratory system to be a key concern to delivering a sustainable transport network for the town. However, the potential impact of 4,000 new homes is a key issue for residents and also has implications for the economic growth of the local area.

# 6. Base Model Development, Calibration and Validation

## 6.1 Introduction

In order to assist in the identification of existing and future transport problems in the town centre a micro simulation transport model has been developed using S-Paramics software. This provides a simulation of the highway network in terms of network capacity including accurate modelling of junctions, but also enables driver's behaviour to be represented following changes to the network. This section summarises the development of the area wide transport model.

## 6.2 Model Development Overview

The type and complexity of a traffic model depends on the scale of the scheme that is proposed. It is considered that given the nature of the existing and proposed future highway networks and the location of planned future growth that there is likely to be significant changes to travel patterns within Attleborough and at the A11 junctions which provide access to the town.

An appropriate traffic model has therefore been developed which is sufficiently detailed to:

- replicate observed, existing traffic flow conditions;
- identify potential traffic that might divert to alternative routes, including proposed link road options; and
- understand the impact of future highway schemes and developments on the local highway network.

The main objective of the traffic model is to assist Breckland Council in assessing the impact of the significant growth planned in Attleborough over the next 18 years. The model has been used to evaluate the need for improvements on the town centre highway network and also the need and timing of a new link road to the south west of the town.

The model developed has been undertaken to ensure that it provides a robust platform for option testing and assessment and included the following key stages:

- Determination of the extents of the area to be modelled;
- Development and identification of model zone system;
- Highway network development;
- Demand matrix development;
- Model assignment; and
- Model calibration and validation.

In addition to the micro simulation model a number of supporting junction models have also been developed to provide engineering values for junction capacity consideration and to inform the assessment of scheme options at each individual junction.

### *6.2.1 Study Area*

The extents of the area to be covered and the level of detail required for each part of the model area, under both do-nothing and do-something scenarios are important considerations in the

design of a traffic model. In accordance with TAG Unit 3.19 the geographical coverage of highway assignment models generally needs to:

- Allow for the strategic re-routing impacts of interventions;
- Ensure that areas outside the main area of interest, which are potential alternative destinations, are properly represented; and
- Ensure that the full lengths of trips are represented for the purpose of deriving costs.

In order to forecast the impact of future growth proposals and develop appropriate solutions, the micro simulation model includes all major links and important minor roads within Attleborough and links in and out of the town. The extents of the study area are shown in Figure 6.1 below as compared with the extents of the town centre area.

**Figure 6.1 - Attleborough Paramics Model Study Area**


## 6.3 S-Paramics Micro Simulation Modelling Software Overview

### *6.3.1 Overview*

S-Paramics is a suite of specialist software tools and represents a radical new approach to the understanding, representation and analysis of road traffic. Individual vehicles are modelled in fine detail for the duration of their entire trip, providing the accurate traffic flow information necessary for the analysis of saturated road networks.

A holistic approach to traffic modelling has been adopted within Paramics as the same methodology and assumptions are applied to all traffic issues regardless of the scale or complexity of the study. Consequently, Paramics would treat traffic behaviour at a single isolated junction in exactly the same manner as it would treat traffic behaviour on the national road network. Paramics achieves this by simulating, at a speed faster than real time, the

behaviour that each vehicle reacts to all other vehicles around it using simple rules of driver behaviour. As such Paramics represents an improvement upon traditional traffic modelling tools which use formulae that relate vehicle delay to traffic flow as a proxy for driver behaviour. All known components of driver behaviour likely to significantly affect traffic flow are represented, across the full range of road network types.

### *6.3.2 Driver and Vehicle Behaviour*

The movement of individual vehicles within Paramics is governed by three interacting models representing; vehicle following, junction (gap acceptance) and lane changing behaviour. All three model types are of a form well documented in transport research and accepted worldwide. The innovative aspect of Paramics is that these models are applied at the level of individual vehicles to simulate the traffic conditions of wide area transport network, within the framework of an easily used software suite. Vehicle dynamics are relatively simple, combing a mixture of driver behaviour and some limitations based on vehicles' physical type and kinematics (e.g. size and acceleration/deceleration).

Individual driver behaviour is determined through the random allocation of aggression and awareness characteristics to the driver of each vehicle. Junction behaviour (gap acceptance), top speed, headway and propensity to change lane are examples of quantities that vary according to these behaviour parameters.

### *6.3.3 Road Network*

Paramics is sensitive to the definition of the road network and the success of the model in reproducing the existing situation. Forecasting changes in travel behaviour is largely dependent on the accuracy of the description of the road layout and geometry.

Unlike traditional models neither travel timed nor proxies for junction capacities are defined in the traffic model. Instead the physical properties of the road network are defined (e.g. traffic signal timings, lane widths, lane arrangements at junctions, bus stop locations, on-street parking, etc.). The speed of each vehicle is determined by the interaction between vehicles within the constraints imposed by the road layout.

### *6.3.4 Public Transport*

Each Paramics model contains a database of bus routes. Buses are subject to the same modelling treatment as other vehicles on the network, in relation to the rules associated with vehicle following, gap acceptance and lane changing. The exception being that buses follow fixed routes.

The model therefore simulates the impact of public transport and the use of elements such as bus priority measures (e.g. bus activated signals) on other road users.

### *6.3.5 Alternative Traffic Modelling Tools*

S-Paramics offers a number of additional features to those offered by more traditional models (e.g. SATURN). These enhance the investigation of the traffic impacts of traffic management proposals and include the following:

- Dynamic modelling (drivers react to conditions as they experience them)
- Junction interaction, including the effect of an over-capacity junction affecting the operational performance of another junction upstream (e.g. blocking back)
- Conflicts and interactions between road users, such as buses queuing to access bus stops, lane blocking by goods vehicles, or incident modelling
- Sensitivity to highway design issues, such as vehicle restrictions, road alignment turning radii, location of bus stops

- Sensitivity to transport policy issues such as on and off street parking restrictions
- A pollution emissions model sensitive to vehicle acceleration, deceleration and queuing vehicles

Additionally, whilst Paramics model reports traditional measures such as link flows (vehicles per hour); percentage of heavy vehicles and journey times in a manner similar to other modelling suites, Paramics presents the information visually. The visual presentation of information means that Paramics acts as an ideal aide during public consultations.

## 6.4 Data Collection

The data collection required to develop the Attleborough traffic model falls into two categories. Building the highway network requires data relating to the physical dimensions and properties of the road network to be modelled. This data can take the form of maps, photographs and road sign information and is used to define the road network and the behaviour of the traffic on the network. In order to create the traffic demand matrices and to assess route choice through the model network another set of data, typically in the form of traffic counts and ANPR surveys, is required.

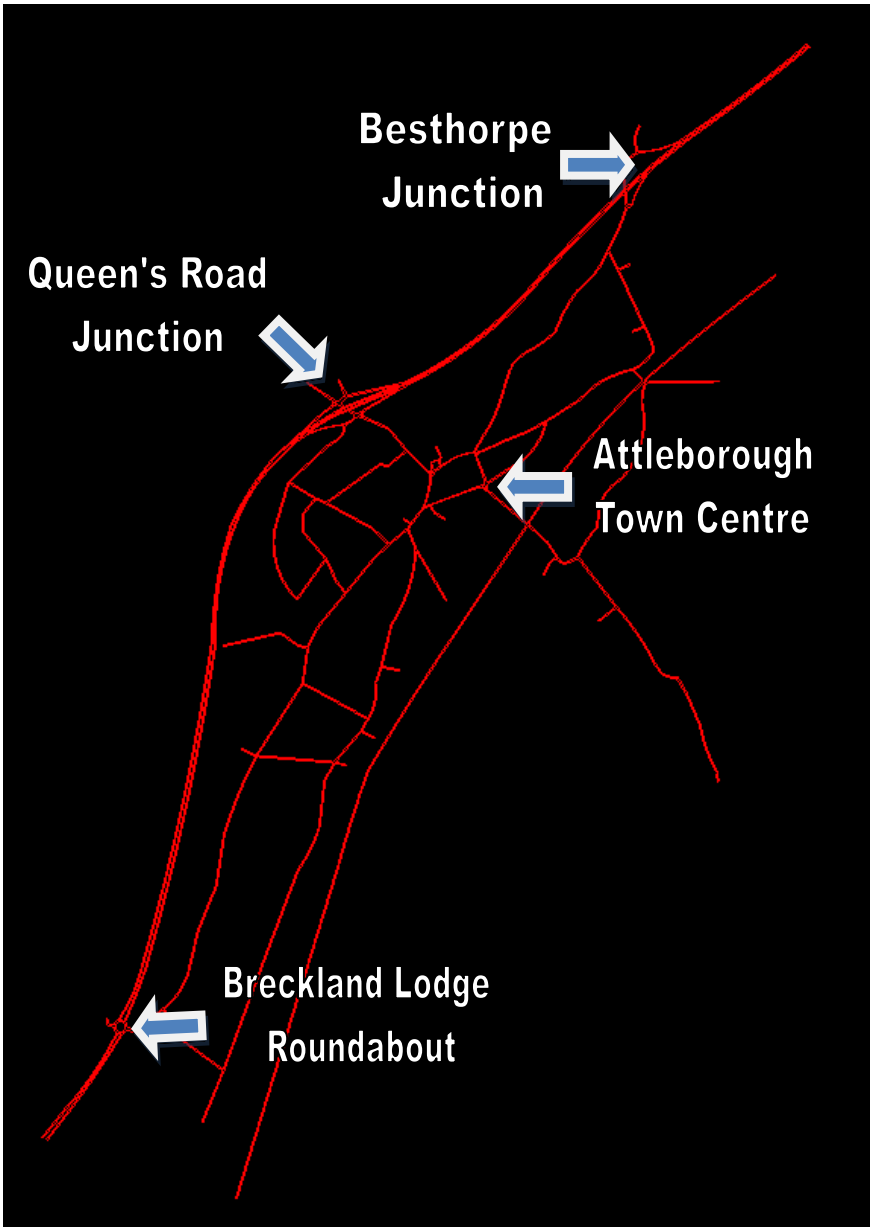
To ensure that the Paramics model reflects existing conditions in terms of the highway network, Capita Symonds utilised a significant volume of information already available such as Ordnance Survey data, aerial photography, junction drawings and traffic signal timing data. The DXF format files of the network and detailed notes from site visits including videos of journeys around the town centre have proved invaluable in the development of the traffic model network. To ensure that the Paramics model accurately reflects existing conditions in terms of the demands on the highway, a significant amount of traffic data was collected as detailed in Section 3.

## 6.5 Base Network Development

### *6.5.1 Introduction*

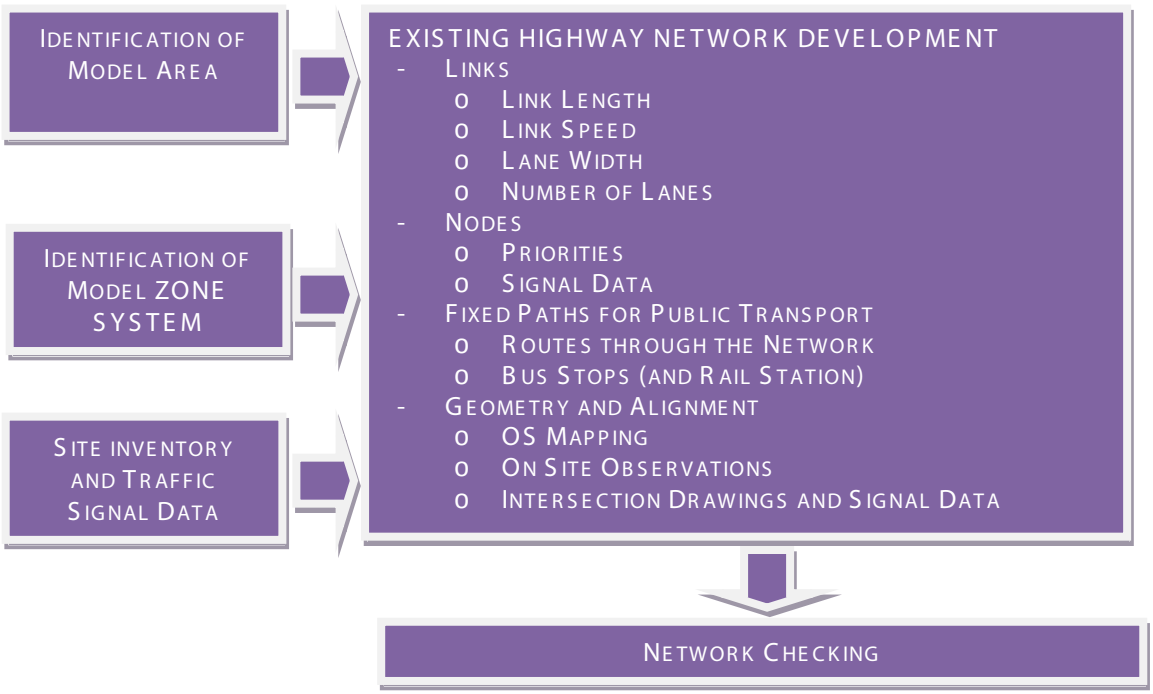
A base year highway network has been developed using OS mapping data which includes all major links within Attleborough including the A11 from south of the Breckland Lodge roundabout to east of the Besthorpe intersections. Important minor roads which provide access to the main distributor routes have also been included. The network structure developed is shown overleaf in Figure 6.2.

**Figure 6.2 – Proposed Paramics Network Structure**




The observations made during site visits and other sources of information have been used to inform the positioning of stop lines, lane allocations and on-street parking, etc. An overview of the network development stages of the study is provided in Figure 6.3 overleaf.

**Figure 6.3 Overview of Network Model Development**




### 6.5.2 *Level Crossing*

As all other traffic data and in particular journey time data was collected prior to the upgrade of the Station Road level crossing, the base model has been validated by applying the average duration of level crossing closures taken from the 2010 level crossing survey. All future year models have been adjusted to reflect the average closure times from the 2013 survey.

Surveys of level crossing demand identified in Appendix G indicated during both morning and evening peak periods that the crossing was closed on average for 4.5 minutes. Within the traffic model the existing rail timetable[6] has been used to inform train times, and for each train the average closed time will be used to replicate the crossing closure on Station Road. The automated level crossing on Bunwell Road is also within the model extents. The Bunwell Road crossing will be modelled as closing for 2.5 minutes per train, this replicates the reduced time as a result of automation (and distance from the station).

### 6.5.3 *Signalised Junctions and Crossings*

There is only one signalised junction within the model area (A11 / Ellingham Road / Queens Road), timing data for the junction was available from NCC and comprised of average stage and cycle times for the junction.

### 6.5.4 *Public Transport*

As agreed with Breckland Council bus route and service information has been taken from www.travelinesoutheast.org.uk. Rail services have also been coded into the network based on timetabled information with each service activating the Station Road level crossing.

### 6.5.5 *Network Usage Driver Behaviour*

Site visits of the study area were conducted to obtain detailed information on elements such as actual lane usage and observations of vehicle behaviour. A comprehensive set of photographic and video records were made for reference purposes.

[6] www.nationalrail.co.uk

### 6.5.6 *Vehicle Routing*

The basic assignment model within Paramics is an 'All or Nothing' (AON) routine, whereby all vehicles will select the minimum cost path based upon the generalised cost criterion specified. It is proposed the Attleborough Base Year Model is however supplemented by additional functions, which enable a more realistic set of route choice decisions to be made. The generalised cost equation calibrated for the model is as follows:

*Generalised Cost = 1.0 x Time + 0.7 x Distance*

A weighting of 0.7 will initially be applied to the distance co-efficient to prevent vehicles re-routing unrealistic distances due to potential congestion in the network. A perturbation factor of 5% will be applied to cars and light goods vehicles and a factor of 0% applied to medium and heavy vehicles in line with best practice guidelines provided by SIAS Limited, the developers of S-Paramics) (Knowledgebase Article ID:000090). Perturbation reflects driver's differing perceptions of costs and is essential for creating accurate route choice.

A dynamic re-routing facility will be invoked in the model to allow drivers to react to delays, which might occur at certain locations. This routine 'feeds back' the junction delay information to drivers at a user defined time interval (two minutes is proposed) at which point they can reassess their optimum route to their destination. The feedback routine is only applied to familiar drivers who may be inclined to divert or use 'rat-runs', whilst unfamiliar drivers route choice remains unaffected by junction delays.

## 6.6 Base Matrix Development

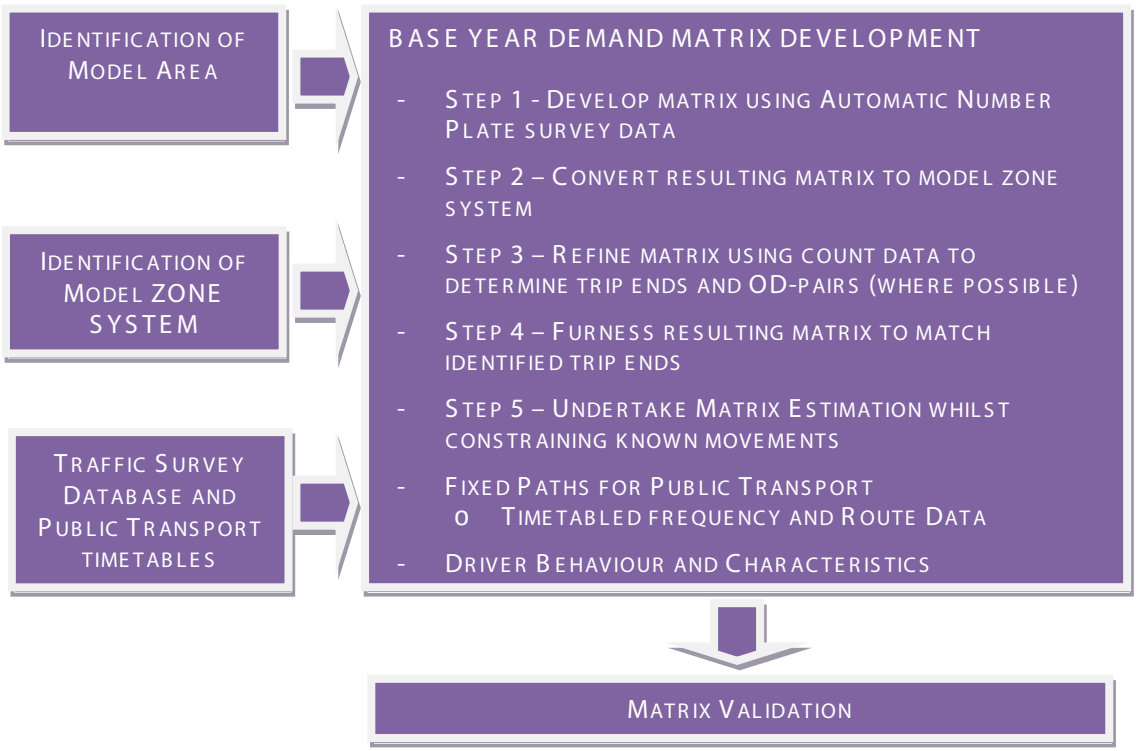
### 6.6.1 *Travel Demand*

The dynamic assignment methodology adopted provides the ability for the model to calculate route choices from origins to destinations through a minimum cost route assignment. Dynamic assignment provides the ability for the model to calculate route choices from origins and destinations through a minimum cost route assignment. The benefit being that it is then able to achieve trip re-distribution when testing new proposals.

A dynamic assignment approach has been selected over a static 'fixed path' model as the potential re-assignment of trips onto the proposed link road options and the relief offered to the town centre by introducing such a scheme are best replicated by the resulting forward-thinking route choice. The use of a dynamic assessment would also be appropriate for any future modelling required for economic scheme appraisal which may be required for funding bids to the Norfolk and Suffolk Local Transport Body or the Department for Transport.

An overview of the base matrix development stages of the study is provided in Figure 6.4 overleaf.

**Figure 6.4 – Overview of Model Matrix Development**




#### *6.6.1.1 Matrix Levels*

Two trip matrices will be created for each time period for the following vehicle types:

- Cars and Light Vehicles
- Heavy Goods Vehicles

#### *6.6.1.2 Time Periods*

Following review of the traffic data detailed in Section 3 matrices will be developed for each of the following time periods to model the peak periods from an un-congested state in accordance with best practice;

- 07:30hrs – 09:30hrs as the AM peak; and
- 15:30hrs – 17:30hrs as the PM peak.

A “warm up” before and “warm down” after the modelled peak periods of 30 minutes will be included to ensure the model network is loaded with traffic prior to the peak period. This is based on the peak hours identified from local traffic data of 08:00-09:00 for the AM peak and 16:00-17:00 for the PM peak.

At this time the inter-peak period has not been incorporated into the modelling as it is not considered essential to determine the impact of transport interventions and land use proposals. The model has therefore been developed to deal with the network at extreme capacity which is during the AM and PM peak periods.

### *6.6.2 Base Year*

The traffic model has been developed to a common base year of 2012 as this reflects the year both ANPR and journey time surveys have been completed. All traffic counts presented in Section 3 to be used within the matrix estimation process will be growthed up to 2012 using the

appropriate TEMPRO growth factors adjusted by National Trip-End Model (NTM) assumptions. All counts undertaken in non neutral months will be checked for seasonality bias, where appropriate factors will be applied from the DMRB seasonality index or local data where available.

### 6.6.3 *Zone System*

The zone structure has been developed in accordance with network loading points from residential areas, employment areas and other large trip generators such as schools and supermarkets within Attleborough. To improve matrix development, the zone structure has been developed to follow a specific structure of internal and external zones. This ensures the application of growth factors and adjustments can be easily identified and explained. The zone structure is presented in Table 6.1 below. A plan showing the extents of each model zone is provided in Appendix L.

**Table 6.1 - Proposed Base Model Zones**

| ZONE | | DESCRIPTION | LAND USE |
|---|---|---|---|
| EXTERNAL | ZONE 1 | A11 WEST | - |
| | ZONE 2 | A11 EAST | - |
| | ZONE 3 | B1077 ATTLEBOROUGH ROAD | - |
| | ZONE 4 | ELLINGHAM ROAD | - |
| | ZONE 5 | HARGHAM ROAD | - |
| | ZONE 6 | NORWICH ROAD | - |
| | ZONE 7 | WROO ROAD | - |
| | ZONE 8 | DEOPHAM ROAD | - |
| INTERNAL | ZONE 9 | ATTLEBOROUGH HIGH SCHOOL | EMPLOYMENT |
| | ZONE 10 | TOWN CENTRE QUEEN'S SQUARE CAR PARK | RETAIL |
| | ZONE 11 | TOWN CENTRE EDEN SIDE CAR PARK | RETAIL / EMPLOYMENT |
| | ZONE 12 | HOUSING AROUND CHAPEL AND BLACKTHORN ROAD | RESIDENTIAL |
| | ZONE 13 | HOUSING AROUND BESTHORPE ROAD AND ATTLEBOROUGH JUNIOR SCHOOL | RESIDENTIAL |
| | ZONE 14 | HOUSING AROUND THEIVES LANE | RESIDENTIAL |
| | ZONE 15 | HOUSING AROUND HARGHAM ROAD AND LEYS LANE (NORTH OF TRAINLINE) | RESIDENTIAL |
| | ZONE 16 | INDUSTRIAL ESTATE ON MAURICE GAYMER ROAD AND LANE OPPOSITE IT | EMPLOYMENT |
| | ZONE 17 | AREA OF HOUSING ON B1077 BUCKENHAM ROAD | RESIDENTIAL |
| | ZONE 18 | SECOND SMALL AREA OF HOUSING ON B1077 BUCKENHAM ROAD | RESIDENTIAL |
| | ZONE 19 | BUNNS BANK INDUSTRIAL ESTATE | EMPLOYMENT |
| | ZONE 20 | RETAIL UNITS OF SAINSBURY'S AND LIDL | RETAIL |

### 6.6.4 *Demand Profiles*

In order to accurately represent real life conditions, Paramics allows traffic entering the network to be released in a controlled manner. This is known as demand profiling. Each hour is split into 12 time slices of 5 minutes and traffic flows are analysed to determine how much traffic enters the network in each time slice. Demand Profiles have been created for all zones within the traffic model based upon the traffic profiles developed from the observed traffic counts.

### 6.6.5 *Prior Matrices*

Prior matrices have been developed from ANPR surveys undertaken in December 2012 and used to derive origin and destination data. Consideration has been given to the level of matched records with the necessary adjustments made to account for any obvious lack of matches.

Post initial development from the origin and destination surveys the prior matrices has been developed using several other data sources including;

- School travel plans will be used to derive trips to the existing schools. Total pupil numbers will be taken from Ofsted's official website[7] (assumed 30% of school trips are linked trips);
- Observations made during peak hour site visits;
- TRICS database to provide the percentage splits for different land uses and demand for supermarket; and
- Observations of car park capacities and occupation.

The prior matrices were inputted into the Matrix Estimation (ME) support module for S-Paramics. The process required turning and link counts at strategic points on the highway network to construct survey data files which are used to inform the ME process. The 2007 traffic surveys growthed to 2012 completed as part of the initial Bidwell's work have been used to inform the survey files. Norfolk County Council has confirmed the suitability of using these counts due to the limited traffic growth or change in travel patterns likely to have occurred in recent years.

Detailed within TAG Unit 3.19 it is good practise to include reasonable constraints on the prior matrix to ensure Matrix Estimation does not alter the prior matrices drastically. Therefore, appropriate constraints have been applied to the matrices prior to running through ME.

## 6.7 Trip Matrix Calibration and Model Validation

### 6.7.1 *Calibration Criteria*

In order to demonstrate that the models provide a robust platform for testing transport interventions and development proposals it is necessary to show that the base model accurately represents observed conditions. The outputs from the post matrix assignment have therefore been compared with observed data in order to ensure that day-to-day conditions are accurately replicated in the model.

The base year model has been calibrated against the guidance contained within TAG Unit 3.19 which requires a comparison between the modelled and observed link/turning counts utilising the GEH (Geoffrey E. Havers) statistic. The GEH statistic is used as an indicator of 'goodness of fit'. The equation used to calculate the GEH statistic is presented below;

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

Where: M = modelled flow;
C = observed flow (or count).

[7] www.ofsted.gov.uk

Table 6.2 below presents the guidelines for turning counts within TAG Unit 3.19 which will be used during calibration and validation of model matrices.

**Table 6.2 – Link Flow and Turning Movement Validation Criteria and Acceptability Guidelines from TAG Unit 3.19**

| Criteria | Description of Criteria | Acceptability Guideline |
|---|---|---|
| 1 | Individual flows within 100 veh/h of counts for flows less than 700 | >85% of cases |
| | Individual flows within 15% of counts for flows from 700 to 2,700 veh/h | >85% of cases |
| | Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h | >85% of cases |
| 2 | GEH < 5 for individual flows | >85% of cases |

### *6.7.2 Calibration Results*

Table 6.3 below provides a summary of the calibration results comparing observed traffic flows with modelled flows indicating a high level of calibration across the 59 movements within the calibration count set. A more detailed breakdown of these results is presented within Appendix M.

**Table 6.3 – Model Calibration Summary Results**

| | **Within 15%** | **Within 25%** | **Within 50%** | **GEH 5.0** | **GEH 7.0** | **GEH 10.0** |
|---|---|---|---|---|---|---|
| **AM Peak Hour 08:00-09:00** | | | | | | |
| FAILED | 1 | 0 | 0 | 2 | 1 | 1 |
| PASSED | 58 | 59 | 59 | 57 | 58 | 58 |
| % | 98% | 100% | 100% | 97% | 98% | 98% |
| **PM Peak Hour 16:30 – 17:30** | | | | | | |
| FAILED | 2 | 0 | 0 | 5 | 0 | 0 |
| PASSED | 57 | 59 | 59 | 54 | 59 | 59 |
| % | 97% | 100% | 100% | 92% | 100% | 100% |

### *6.7.3 Base Model Validation*

Journey time surveys have been completed in the AM and PM periods during a typical weekday i.e. outside of school holidays and excluding a market day. These will be compared with comparable modelled journey times to ensure the model is representative of reality. Chapter 3.2 Paragraph 3.2.5 of TAG Unit 3.19 identifies the acceptable validation criteria for journey times and is presented below in Table 6.4.

**Table 6.4 - Journey Time Validation Criterion and Acceptability Guidelines from TAG Unit 3.19**

| Criteria | Acceptability Guideline |
|---|---|
| Modelled times along routes should be within 15% of surveyed times (or 1 minute if higher) | >85% of routes |

In accordance with TAG Unit 3.19 the variability of observed journey times will be presented and discussed to ensure the journey times used are both representative and ensure that the mean of the observations is plus or minus 10% for all routes; at a 95% level of confidence.

**Table 6.5 – Journey Time Variability**

| Route | Average (s) | Min (s) | Max (s) | St Dev | SE | Con -95% | Con +95% | Coefficient of Variation |
|---|---|---|---|---|---|---|---|---|
| Blue Route S'bound Am | 289 | 215 | 346 | 67.26 | 38.83 | 213 | 365 | 23.2% |
| Blue Route S'bound Pm | 265 | 255 | 273 | 7.55 | 3.77 | 257 | 272 | 2.9% |
| Blue Route N'bound Am | 241 | 197 | 285 | 44.00 | 25.41 | 192 | 291 | 18.2% |
| Blue Route N'bound Pm | 282 | 222 | 426 | 96.89 | 48.44 | 187 | 376 | 34.4% |
| Red Route N'bound AM | 424 | 418 | 431 | 9.19 | 6.50 | 412 | 437 | 2.2% |
| Red Route N'bound Pm | 393 | 383 | 404 | 14.85 | 10.50 | 373 | 414 | 3.8% |
| Red Route S'bound Am | 373 | 351 | 386 | 19.40 | 11.20 | 351 | 395 | 5.2% |
| Red Route S'bound Pm | 407 | 407 | 407 | 0.00 | 0.00 | 407 | 407 | 0.0% |
| Green Eastbound Am | 235 | 233 | 238 | 2.65 | 1.53 | 232 | 238 | 1.1% |
| Green Eastbound Pm | 236 | 233 | 239 | 4.24 | 3.00 | 230 | 242 | 1.8% |
| Green Westbound Am | 240 | 222 | 252 | 15.70 | 9.06 | 222 | 257 | 6.5% |
| Green Westbound Pm | 241 | 238 | 243 | 3.54 | 2.50 | 236 | 245 | 1.5% |

Table 6.5 above identifies three of the Highways Agency journey times provided by Breckland Council do not fall within a +/-10% range of the mean at a 95% confidence limit. Due to time constraints as a result of school holidays and project milestones, further journey time data could not be collected. Therefore the Highways Agency Journey times were used to calculate an average journey time for specific routes.

**Table 6.6 – Journey Time Validation Results**

| Journey Times | Observed | | | Modelled | Meets Criteria |
|---|---|---|---|---|---|
| | Minus 15% | HA Average | plus 15% | | |
| **Am 08:00 - 09:00** | | | | | |
| Blue Route Southbound | 00:04:06 | 00:04:49 | 00:05:33 | 00:04:22 | PASSED |
| Blue Route Northbound | 00:03:25 | 00:04:01 | 00:04:38 | 00:03:42 | PASSED |
| Red Route Northbound | 00:06:01 | 00:07:04 | 00:08:08 | 00:06:22 | PASSED |
| Red Route Southbound | 00:05:17 | 00:06:13 | 00:07:09 | 00:05:30 | PASSED |
| Green Route Eastbound | 00:03:20 | 00:03:55 | 00:04:30 | 00:04:10 | PASSED |
| Green Route Westbound | 00:03:24 | 00:04:00 | 00:04:36 | 00:03:53 | PASSED |
| **PM 16:30 - 17:30** | | | | | |
| Blue Route Southbound | 00:03:45 | 00:04:25 | 00:05:04 | 00:03:50 | PASSED |
| Blue Route Northbound | 00:03:59 | 00:04:42 | 00:05:24 | 00:05:18 | PASSED |
| Red Route Northbound | 00:05:34 | 00:06:33 | 00:07:33 | 00:06:12 | PASSED |
| Red Route Southbound | 00:05:46 | 00:06:47 | 00:07:48 | 00:05:30 | FAILED |
| Green Route Eastbound | 00:03:21 | 00:03:56 | 00:04:31 | 00:04:01 | PASSED |
| Green Route Westbound | 00:03:24 | 00:04:01 | 00:04:37 | 00:03:48 | PASSED |

Table 6.6 above illustrates only the Red Route Southbound journey time during the PM peak does not validate. The modelled time is one minute one second faster than the HA average journey time and 16 seconds faster than the lower 15% range, so only just fails validation.

The remaining journey times all meet the validation criteria set out in Table 6.4. The model journey times fall both below and above than the average HA journey times showing a suitable level of variability. Given that only one journey time fails to validate 93% of the base model journey times validate, therefore the base model is shown to be fit for purpose.

# 7. Strategy Overview

## 7.1 Future Conditions

The emerging Breckland Local Plan is likely to place a particular focus on the development and regeneration of existing urban areas within the borough. Attleborough has already been identified as a key centre earmarked for significant growth as outlined in previous sections. These plans for growth will lead to significant changes to the transport network in and around Attleborough town centre.

The development of the transport network within Attleborough is fundamental to delivering the plans for growth. However, there are only a limited number of committed transport schemes relating to the already approved London Road residential development. These include:

- Improvements to the Breckland Lodge Roundabout; and
- Signalisation of the Exchange Street / Connaught Road junction.

However, the delivery of future housing and employment developments in the town is likely to further impact on the capacity and efficiency of the transport network in and around Attleborough town centre. To produce an effective transport strategy to accommodate the proposed developments, consideration needs to be given to how traffic flows will change in relation to them.

A full summary of the impacts on the highway network of these developments is provided in Section 8, but the main points (from the Low Growth modelling) are provided below:

- Average journey times will increase from 129 to 313 seconds in the AM peak and 117 to 429 seconds in the PM peak between 2012 and a 2031 Do-Minimum scenario.
- Average traffic speeds on the network would fall from 45km/h in the 2012 base year AM peak to 18km/h in the 2031 Do-Minimum scenario. This is echoed in the PM peak with average speeds falling from 40km/h in the base year to 12km/h in 2031 Do-Minimum.
- The congested conditions experienced on the town centre one way system create long queues on the approaches to the town centre. These get progressively worse as more development is realised.
- Queuing is also experienced on the A11, particularly on the approaches to the Breckland Lodge roundabout.

## 7.2 Strategy Development

### *7.2.1 Identification of Issues and Options*

It is important for the future development of the town that the transport network is able to support efficient and sustainable access for all users. For this to be possible, measures need to be taken to mitigate the impact of the proposed developments within the town. This needs to be done in a sustainable way that does not affect the attractiveness of Attleborough as a place to live or adversely impact on the town centre conservation area. This can be achieved through the development of a comprehensive transport strategy that addresses not only capacity issues that exist on the network but that also address the need for travel to and through Attleborough town centre.

There are many different users that need to use the transport network for a variety of purposes at different times of the day. A broad range of consultation responses have been considered in order to ensure that all the issues have been identified. In addition to this, the views of

stakeholders and the public in relation to potential options have also been identified, and fed into the strategy and options development.

The Breckland Core Strategy document highlights specific priorities for Attleborough; such as the creation of a new distributor road from the A11 to the B1077, improved junction capacity to the A11 and a new road crossing over the railway to increase capacity.

Initial research in the Breckland Infrastructure Study has identified and prioritised other transport improvements for Attleborough that will help reduce car use and ease congestion in the town centre as illustrated in Transport Priorities for Attleborough identified in initial research and summarised below in Table 7.1.

**Table 7.1 – Transport Priorities for Attleborough Identified in Initial Research**

| Transport Requirement | Priority |
|---|---|
| Improvement to rural bus services | Essential |
| Re-examination of the town centre gyratory system and potential improvements | Essential |
| Eastern link from B1077 to Besthorpe Junction | Desirable |
| A new bus station | Desirable |
| Rail station improvements | Desirable |
| New distributor road from the B1077 to the A11 | Critical |

Other issues such as the need to provide a cohesive network of walking and cycling routes and ensuring appropriate car parking provision within the town centre were also identified.

The list of potential transport improvements outlined above present a number of opportunities to resolve existing transport issues on the network and guard against worsening conditions in the future. It should however be noted that the benefits could be accrued from the implementation of a number of the individual options alone. From the options presented above there are three significant infrastructure options put forward which have been tested in detail in the traffic model, including changes to the town centre gyratory system, a new Eastern link road from the B1077 to Besthorpe Junction and a new distributor road from the B1077 to the A11.

### *7.2.2 Sieving of Options*

It is possible to consider a number of different options for each of the 3 transport schemes identified which could be tested within the traffic model. These are considered in Table 7.2 below:

**Table 7.2 – Infrastructure Scheme Options for Model Testing**

| Option | Scheme Description |
|---|---|
| **A) Town Centre Gyratory** | |
| Option 1 | Convert Surrogate Street to Two-way |
| Option 2 | Convert Connaught Road to Two-way |
| Option 3 | Convert both Surrogate Street and Connaught Road to Two-way |
| **B) Eastern Link from the B1077 to Besthorpe Junction** | |
| Option 1 | Single carriageway 2 lane 30mph |
| Option 2 | Single carriageway 2 lane 60mph |
| **C) New Western Distributor Road from the B1077 to the A11** | |
| Option 1 | Single carriageway 2 lane 30mph northern alignment |
| Option 2 | Single carriageway 2 lane 30mph central alignment |
| Option 3 | Single carriageway 2 lane 50/60mph southern alignment |

### 7.2.3 *Town Centre Gyratory*

The options identified in Table 7.2 for the town centre gyratory include converting various sections of the one way system to two-way. Any options to convert High Street and/or Church Street to two-way have not been included as this would impact on on-street parking and loading provision where these are likely to be highly sensitive. Re-introducing two-way traffic on these streets may also adversely affect the environment and safety within the town centre by increasing traffic and increasing levels of confusion amongst pedestrians on the town centre streets which experience the heaviest footfalls.

It is considered that in order to provide the maximum benefit to the town centre in terms of reducing the impact of increased traffic; re-introducing two-way traffic on Connaught Road and Surrogate Street offers the most favourable option in that the majority of movements (with the exception of those to/from Queen's Road) through the town centre can be transferred from Exchange Street and Connaught Road onto Surrogate Street and Connaught Road; which experience lower footfalls and are less sensitive to changes to on-street parking and loading provisions. This option is also likely to be the most effective in removing HGV traffic from Exchange Street and Church Street.

In light of the above, it is considered that the introduction of two-way traffic on both Connaught Road and Surrogate Street provides the preferred option for the town centre gyratory as it offers the greatest flexibility in terms of routing options for movements across the town centre and would also remove the majority of traffic from High Street and Church Street improving conditions for pedestrians and cyclists. A number of different junction options have also been considered in order to accommodate these changes as detailed in Section 8.

### 7.2.4 *Eastern Link from the B1077 to Besthorpe Junction*

There are a limited number of options for the provision of an Eastern link from the B1077 to Besthorpe junction. It is considered highly likely that White House Lane would be upgraded as part of the enabling infrastructure for the adjacent residential developments to be provided to the east of the B1077. As such the upgraded White House Lane is likely to be fronted by residential properties with private accesses and has therefore been modelled as a single carriageway two lane road with a 30mph speed limit in the 2031 future year scenarios. Prior to 2031 the road is modelled as a single track rural road with passing places as is consistent with the base year model.

### 7.2.5 *New Western Distributor Road from the B1077 to the A11*

The options for a new distributor road from the B1077 to the A11 have been informed by the link road options presented within the Capita Symonds Link Road Study Report. However, it is considered that modelling the northern (SK01) and central (SK02) options separately would likely result in imperceptible differences between outputs and as such have been considered as a single option. In order to inform the findings of the Capita Symonds Link Road Study and to assess the impacts of the link road on the town centre network, two link road options have been assessed within the network modelling. Both options assume a single two lane carriageway although the alignments and assumed speed limits differ with the southern option assumed to be a wrap-around highway with a 50/60 mph speed limit providing access to residential streets and a northern/central option with a 30mph speed limit which passes through the centre of new residential developments to the west of the B1077.

## 7.3 Specification of Options

With a preferred list of options defined, the next stage of the strategy development required testing the options in the transport model to determine what impact they have on network operation.

In order to identify at what stage various measures are required a number of future years have been assessed up to 2031. The base year for the model is 2012 with future years modelled to reflect the Scott Wilson Masterplan stages as follows:

- Stage 1: 2017
- Stage 2: 2021
- Stage 3: 2024
- Stage 4: 2027
- Stage 5: 2031

The order in which various development sites come on line has also been informed by the Scott Wilson Masterplan although changes have been made following discussions with Breckland Council which reflect more recent discussions with developers. Each of the transport scheme options can be tested within the traffic model assuming full implementation of the AAP developments, to determine whether the option will work in the future year. Assessment can then be made on a suitable phasing strategy for the preferred option in the knowledge that this strategy will address the transport issues following implementation of Local Plan development and background traffic growth.

# 8. Future Year Forecasting

## 8.1 Introduction

In order to provide a base for testing the proposed highway schemes it was necessary to develop future year models from the previously validated base models. Whilst the 2012 base year models represent existing conditions in Attleborough town centre (prior to level crossing upgrade) it is necessary to develop a number of future year scenarios to assess what the likely future transport problems could be.

The development of the future year models for the purpose of assessing the impact of the proposed developments and supporting highway schemes is described in the following sections.

## 8.2 Development Proposals

### *8.2.1 Residential Housing*

The proposed development at Attleborough comprises of 4,000 dwellings as per the assumptions within the Attleborough and Snetterton Heath Area Action Plan Issues and Options document (November 2010). For the purposes of this study it has been assumed that this development shall be delivered by 2031 in line with the Scott Wilson Masterplan for Attleborough.

The location of housing is also based on the preferred option in the Scott Wilson Master Plan; although these assumptions have been amended slightly to take account of planning applications received and recent discussions with developers.

We acknowledge that the planning application from Taylor Wimpey for the erection of 375 dwellings at land on London Road has been approved and the Phase 1 Masterplan assumptions have therefore been amended accordingly. The remaining Phases of the development (2-5) have been assumed to be 850 dwellings per phase. For the purposes of determining development related traffic, the figures shown in Table 8.3 overleaf have been adopted.

### *8.2.2 Employment Land*

The proposed development also comprises of 2,735 jobs which are expected to be generated by 10 hectares of employment land within Attleborough and a further 20 hectares at Snetterton Heath. For the purposes of modelling, the additional 636 jobs occurring from service sector and population growth are considered to have been captured within background growth. The total of 30 hectares of employment land assumption corresponds with the assumptions within the Attleborough and Snetterton Heath Area Action Plan Issues and Options document (November 2010) although this estimated the provision of 1,500-2,000 jobs. The basis for the 2,735 jobs is provided as Appendix N.

Table 8.1 below and Table 8.2 overleaf show the mix of land uses for employment land at Attleborough and Snetterton Heath respectively.

**Table 8.1 - Future Employment Mix in Attleborough**

| USE CLASS | OPTION 1 – ALL EMPLOYMENT IN THE LONDON ROAD AREA |
|---|---|
| MIX OF USE CLASSES | B1 – 3HA<br>B2 – 7HA |

**Table 8.2 – Future Employment Mix at Snetterton Heath**

| USE CLASS | 6 – 7HA IDENTIFIED TO THE NORTH OF THE A11 AND THE REMAINDER TO THE SOUTH OF THE A11 |
|---|---|
| MIX OF USE CLASSES | B1 – 3HA<br>B2 – 7HA<br>B8 – 10HA |

### *8.2.3 Retail*

A supermarket store is forecast to be delivered as part of the Phase 2/3 proposals. It is assumed as part of the modelling exercise that a similar sized supermarket to the existing Sainsbury's store will be constructed in Phase 2. Therefore the supermarket has been included within all future year models post 2021 (Phase 2).

### *8.2.4 Other Amenities*

Other amenities required to service dwellings will be delivered throughout the various phases of development including schools, local centres, Library etc. The individual amenities have been included in accordance with the Scott Wilson Masterplan. A copy of the schedule is presented in Appendix O Figure 2.

## 8.3 Phasing of Development

The phasing of future year developments has been incorporated within the future year models in accordance with delivery plan in the Scott Wilson Master Plan. The demand from employment land has been profiled evenly each year over the period of 2013 -2031.

For the purposes of determining development related traffic the figures shown in Table 8.3 below have been adopted.

**Table 8.3 – Adopted Development Assumptions**

| FUTURE YEAR | 2017 | 2021 | 2024 | 2028 | 2031 |
|---|---|---|---|---|---|
| JOBS | 1010 | 1503 | 1873 | 2365 | 2735 |
| HOUSEHOLDS | 600 | 1450 | 2300 | 3150 | 4000 |

## 8.4 Future Year Network Development

The future year highway networks have been updated to reflect the agreed scenarios. In accordance with best practice the future year model networks have all been developed from the 2012 base network.

In all there are five variations on the future highway network. This section will detail the separate changes made to each network. The town centre changes of reverting both Connaught Road and Surrogate Street to two way running were developed from the town centre pedestrian and smarter choices work. In order to enhance the town centre environment for pedestrians and protect its historical character the improvements provide an alternative route across the town centre for most vehicular traffic. The link road options are based on the work undertaken for the Attleborough Link Road study.

### *8.4.1 Committed Changes*

Some network changes have already been undertaken or are already committed in that the scheme has been drawn up and funding has been allocated. These schemes are common to all future year networks and include;

- The automation of the level crossing on the B1077 Station Road. This has been completed since the development of the base model. The rail timetables will remain as existing because no new services are planned at the time of writing;

- The agreed improvements to the A11 Lodge Roundabout as part of the London Road residential development. The improvements include the realignment of the roundabout and a bypass lane from London Road to the A11 southbound;

- The agreed improvements to the Exchange Street / Connaught Road junction to introduce traffic signal control and improved pedestrian crossing facilities; and

- The optimisation of traffic signals at the junction of the A11 / B1077 Ellingham Road / B1077 Queens Road (the signals have been optimised in each model to account for the changes in traffic flows as required).

### *8.4.2 Further Network Alterations*

In addition to the committed network changes detailed in the previous section, the following network alterations specific to each set of future year scenario have also been made.

***Do-Nothing (No development, Committed Network Changes)***
Committed network changes only. No further network amendments have been coded. No future development or transport schemes are assumed.

***Do-Minimum (With development, Committed Network Changes)***
The do-minimum scenarios represent a situation where demand for travel within the town centre is expected to increase in line with the implementation of the Local Plan and background traffic growth but the transport network scenario remains constant. Some network changes are however required to facilitate access to the proposed development sites. These include:

- New roundabouts on London Road and on Hargham Road connected by a new link road (roughly aligned to Fowlers Lane) to provide access to the proposed London Road employment sites (NB, the location of the roundabouts varies between the two Link Road options);

- Two new priority junctions with London Road located between Dodds Road and New Road to provide access to proposed residential dwellings;

- The proposed areas of new development to the southwest of Attleborough are connected to the B1077 Buckenham Road via a new roundabout junction located just north of the junction with Borough Lane. Two roundabout junctions have been coded to provide access to new development sites from the main development road. All roads within the proposed area of development to the south west of Attleborough are coded as single lane 30mph links.

- In the future year of 2031, it is assumed that White House Lane would be upgraded to a 5.5m wide carriageway with two way flow as part of the associated residential development on adjacent plots of land.

***Do-Something Town Centre (With development, Town Centre Network Changes)***
The do-something town centre network includes all changes identified in the Do-Minimum Network and the following local highway network improvements;

- Surrogate Street reverted to two way running;

- Connaught Road reverted to two way running;

- The tightening of turning radii at the junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street to facilitate two way running and improve the pedestrian environment by reducing the crossing width for pedestrians;

- The junction of Surrogate Street / Thieves' Lane / Station Road / Connaught Road has been coded to account for the upgrade to two way running. Surrogate Street to Station Road becomes the main north south unopposed route through the junction. Right turn movements from Surrogate Street to Connaught Road and Station Road to Thieves' Lane turn across traffic and benefit from right turn pockets; and

- The junction of High Street / Exchange Street / Connaught Road has been coded to take account of the upgrade to two way running. High Street to Connaught Road has been coded as the main unopposed route across the junction. High Street will still give way to right turning traffic from Connaught Road to Exchange Street. A right turn pocket for a single vehicle has been included on Connaught Road;

***Do-Something Town Centre plus Link Road Option 1/2 (With development, Town Centre Network Changes and Internal Link Road)***
The do-something town centre plus Link Road Option 1/2 includes all changes identified in the Do-something town centre network and the following; additional network changes;

- A new link road crossing the train line connecting the roundabout on Hargham Road to the areas of new development to the southwest of Attleborough and the B1077 Buckenham Road. The link road has been coded as a single lane carriageway with a 30mph speed limit for its entire length.
- A HGV ban has been coded on all routes into the town centre.

The link road has been designed based on the SK01 design presented within the Capita Symonds Attleborough Link Road Study. An alternative option for the SK02 design for a similar residential standard link road has not been modelled as it was felt that the difference between model outputs would be minimal.

***Do-Something Town Centre plus Link Road Option 3 (With development, Town Centre Network Changes and External Link Road)***
The do-something town centre plus link road option 3 includes all changes identified in the do-something town centre network and the following additional network changes;

- The link road is located further south and "wraps around" the proposed development. It is coded as a single lane carriageway with a 60mph speed limit between Hargham Road and the B1077 Buckenham Road, and a 50mph for the short link between Hargham Road and London Road;
- The roundabout junctions on London Road and Hargham Road are relocated further south at approximately 500 metres from the A11 Lodge Roundabout; and
- The roundabout junction on the B1077 Buckingham Road has been relocated further south and forms a roundabout junction with the B1077 Buckenham Road and Bunn's Bank Road.

## 8.5 Future Year Matrix Development

### *8.5.1 Introduction*

The Attleborough base year model has been validated to 2012; in accordance with the fact that most data has been collected in this year. The future year matrices have been developed from the base models with the addition of extra zones to account for future year development. This section will detail the process completed to develop the future year matrices.

### 8.5.2 *Future Years*

The future years are based on the phases identified within the Scott Wilson Masterplan although the delivery profile of development differs from that identified within this document. The future years to be assessed within the traffic impact assessment are as follows;

2017 – End of Phase 1

2021 – End of Phase 2

2024 – End of Phase 3

2028 – End of Phase 4

2031 – End of Phase 5

### 8.5.3 *Background Traffic Growth*

TEMPRO Growth factors adjusted for NTM growth have been applied to the base model following guidance provided in *WebTAG Unit 3.15.2: The Use of Tempro*, in order to generate the future year matrices. Growth factors for the geographical areas of Norfolk, Breckland and Attleborough have been derived from the TEMPRO system for application to different parts of the base matrices to reflect external to external, internal to external and internal to internal variations.

In order to avoid the potential for double counting the initial growth, factors have been derived using alternative planning assumptions which remove any growth in households and jobs within Attleborough (including appropriate adjustments to Breckland and Norfolk factors).

The different growth factors applied to the separate zone types are described below;

**External to External (Bypass) –** Growth factors derived using Norfolk (rural: trunk) with adjusted planning assumptions;

**External to External (Others) –** Growth factors derived using Breckland (all: all) with adjusted planning assumptions;

**External to Internal –** Growth factors derived using Attleborough (all: all) with adjusted planning assumptions:

**Internal to External –** Growth factors derived using Attleborough (all: all) with adjusted planning assumptions: and

**Internal to Internal –** Growth factors derived using Attleborough (all: all) with adjusted planning assumptions

Full details of all TEMPRO growth factors and the different movements they are applied to are provided within Appendix P.

### 8.5.4 *Zone Structure*

Additional zones have been added to account for the separate phases of growth in Attleborough. The additional zones in the future year are split between areas north and south of the train lines. Full details of the additional zones are provided overleaf in Table 8.4.

**Table 8.4 - Future Year Additional Zones**

| ZONE | DESCRIPTION | PHASING | LAND USE |
|---|---|---|---|
| ZONE 21 | RESIDENTIAL DWELLINGS SOUTH OF TRAIN LINE AND WEST OF BUCKENHAM ROAD | PHASE 3 | RESIDENTIAL |
| ZONE 22 | RESIDENTIAL DWELLINGS SOUTH OF TRAIN LINE AND WEST OF BUCKENHAM ROAD | PHASE 2 | RESIDENTIAL |
| ZONE 23 | LONDON ROAD RESIDENTIAL DWELLINGS | PHASE 1 | RESIDENTIAL |
| ZONE 24 | LONDON ROAD EMPLOYMENT AREA | PHASE 1-5 | EMPLOYMENT |
| ZONE 25 | RESIDENTIAL DWELLINGS SOUTH OF TRAIN LINE AND EAST OF BUCKENHAM ROAD | PHASE 4 | RESIDENTIAL |
| ZONE 26 | RESIDENTIAL DWELLINGS SOUTH OF TRAIN LINE AND EAST OF BUCKENHAM ROAD | PHASE 5 | RESIDENTIAL |
| ZONE 27 | MILL LANE RESIDENTIAL DWELLINGS | PHASE 5 | RESIDENTIAL |

In addition to the inclusion of the additional zones shown in Table 8.4, an additional car park will also be added to Zone 20. It has been used to represent the addition of a new supermarket to the south of the railway line as per the Scott Wilson masterplan.

Using car parks within Zone 20 in this way it is possible to replicate the affects of a possible transfer of trips from the existing to the new supermarket. Within Paramics the release and attraction of vehicles to a zone can be controlled by using car parks with the weighting of each car park linked directly to the number and availability of parking spaces. By using this function it is possible to replicate the choice made by users of either supermarket.

### *8.5.5 Proposed Development Trip Demands*

The additional trips generated by new development have been determined using the alternative planning assumptions function within TEMPRO using the following procedure:

- Determine background traffic growth for future years assuming no development in Attleborough; and

- Determine future year traffic growth for future years using planning assumptions for Attleborough based on values provided overleaf in Table 8.5.

The derived factors have been applied to all cells within the base matrices with an internal zone as an origin or destination (or both).The resulting matrix totals have then been subtracted from one another to identify the traffic growth associated with new development.

The trips have been distributed across the new development zones applying distribution based on existing residential and employment zones. A comparison of the trips generated by each zone and TRICS trip generation data has been undertaken to ensure totals are reasonable.

**Table 8.5 – Land Use Proposals for Local Plan sites by Zone**

| Zone | 2017 | | 2021 | | 2024 | | 2027 | | 2031 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **HH** | **Jobs** | **HH** | **Jobs** | **HH** | **Jobs** | **HH** | **Jobs** | **HH** | **Jobs** |
| 21 | 225 | | 275 | | 400 | | 1100 | | 1100 | |
| 22 | | | 475 | | 1200 | | 1200 | | 1200 | |
| 23 | 375 | | 375 | | 375 | | 375 | | 375 | |
| 24 | | 290 | 325 | 522 | 325 | 696 | 325 | 927 | 325 | 1101 |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | 650 | |
| 27 | | | | | | | 150 | | 350 | |
| 28 | | 720 | | 981 | | 1177 | | 1438 | | 1634 |
| **TOTAL** | **600** | **1010** | **1450** | **1503** | **2300** | **1873** | **3150** | **2365** | **4000** | **2735** |

## 8.6 Town Centre Modelling

### *8.6.1 Introduction*

Initial indications suggested the town centre network would experience severe queues and delays during future years as a result of the increase in demand. Further to the analysis of the initial model outputs and consultation with the interested parties; it was considered appropriate to expand the scope of the modelling exercise and suite of software used to inform the analysis of the town centre highway improvements.

This section will detail the approach taken when completing the town centre traffic modelling.

### *8.6.2 Approach*

Whilst this work was driven by the indication that the town centre would experience serious delays and queues it is important to ensure the correct traffic flows are included within the model. To ensure a meaningful and usable set of outputs were produced and on request from Norfolk County Council, a more iterative approach was adopted towards the town centre modelling. Furthermore, Norfolk County Council officers were concerned that whilst a workable solution could be demonstrated using Paramics, it was important to model and future-proof each junction individually.

Therefore the methodology for the town centre modelling was adapted to follow a four stage approach. This is as follows;

- **Stage 1** Network Modelling, 100% demands Central Growth
- **Stage 2** Network Modelling, 100% demands Low Growth
- **Stage 3** Network Modelling, 50% Central Growth
- **Stage 4** Town Centre Junction Models

Each of these stages is described in more detail below.

***Stage 1***

Modelling the network as a whole with 100% demand flows provided the starting point for the traffic modelling and enabled an overview of the overall network performance to be established and identify how junctions within the town centre will interact in future years. The first stage of the traffic modelling included modelling each network option identified in section 8.4.2 for each of the future years listed in Section 8.5.2 using demands derived from central growth forecasts.

***Stage 2***

In order to account for demand responses to future traffic flows and possible congestion within the town centre, a set of demands derived from a low growth forecast were also developed. The

low growth forecast also accounts for work as part of the smarter choices across the town and possible variations in economic growth in future years. Given recent economic trends over the past five years it was considered more appropriate to model a set of low growth scenarios as opposed to high growth.

All scenarios modelled as part of Stage 1 were updated with a low growth demand set and ran as part of Stage 2.

***Stage 3***
The third stage involved using outputs from the Paramics models for input into a set of standalone junction models for each of the town centre junctions likely to be significantly impacted by the proposals.

Due to the close proximity of the town centre junctions and the observed levels of queuing and delays in the Stage 1 and 2 modelling, particularly during the later future years, the demand flows rather than the actual flows were extracted from Paramics.

This was accomplished by running the Paramics models with 50% central demand flows, and multiplying the output traffic flows by two. This approach is approved by SIAS (developers of Paramics software) as it reduces the possibility of congestion within the models; a copy of a support request detailing advice from SIAS is attached within Appendix Q.

The traffic flows were extracted from a set of Paramics models which had all the town centre junctions coded as the most basic form of junction control; a priority arrangement.

The same demand flows for each future year were then entered into the separate models for each of the junctions. Each junction was modelled operating with three separate forms of traffic control, the only difference being the junction of Queens Road / Church Street / Exchange Street, which was assumed to remain as existing due to the war memorial and the fact that the proposed network changes should divert traffic away from this junction so that capacity improvements would not be required.

The various options for the junctions are detailed below;

- Queens Road / Church Street / Exchange Street - (Priority only, i.e. as existing);
- High Street / Connaught Road / Exchange Street - (Priority, Roundabout and Signalised);
- Norwich Road / Besthorpe Road / Surrogate Street / Church Street - (Priority, Roundabout and Signalised); and
- Surrogate Street / Thieves Lane / Station Road / Connaught Road - (Priority, Roundabout and Signalised)

For each form of junction control the five separate scenarios listed in section 8.4.2 for each of the future years listed in section 8.5.2 have been modelled. Modelling each junction separately for each arrangement enables an optimum network strategy to be developed for the town centre.

## 8.7 Stage 1 Outputs and Appraisals

Full outputs of the network summary stats are provided in Appendix R, Figure 1 to 4. The data provided in the appendices is for the whole network and with A11 through traffic removed as this is likely to have a significant masking effect on the performance of the town centre network due to the high speeds and traffic flows on the A11. For the purpose of the further analysis presented below the without A11 statistics have been used.

### *8.7.1 Total Distance Travelled*

The graphs in Appendix R, Figure 1 and Table 8.6 below illustrate for each future year scenario that there is a progressive increase in the total distance travelled. The Do-Nothing scenarios all recorded the lowest distance travelled for each of the future years. The With Link Road Option 3 scenario recorded the highest distance travelled for each of the future year scenarios, although total travel times were generally lower than the Do-Minimum and Do-Something with town centre models.

**Table 8.6 – Total Distance Travelled (Central Growth Traffic Models)**

| Scenario | Total Distance Travelled (km) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base | 10185 | 9917 |
| 2017 Do Nothing | 10542 | 10153 |
| 2017 Do Minimum | 11908 | 12027 |
| 2017 Town Centre | 11740 | 12386 |
| 2017 Town Centre Link Road Option ½ | 11732 | 12016 |
| 2017 Town Centre Link Road Option 3 | 12444 | 12842 |
| 2021 Do Nothing | 11597 | 11597 |
| 2021 Do Minimum | 16457 | 16883 |
| 2021 Town Centre | 16080 | 17270 |
| 2021 Town Centre Link Road Option ½ | 14002 | 16330 |
| 2021 Town Centre Link Road Option 3 | 16689 | 17744 |
| 2024 Do Nothing | 12360 | 12410 |
| 2024 Do Minimum | 19441 | 18693 |
| 2024 Town Centre | 20488 | 20669 |
| 2024 Town Centre Link Road Option ½ | 19035 | 20344 |
| 2024 Town Centre Link Road Option 3 | 20768 | 22617 |
| 2028 Do Nothing | 13301 | 13629 |
| 2028 Do Minimum | 21577 | 20626 |
| 2028 Town Centre | 20957 | 19878 |
| 2028 Town Centre Link Road Option ½ | 23514 | 25488 |
| 2028 Town Centre Link Road Option 3 | 25637 | 28392 |
| 2031 Do Nothing | 14080 | 14528 |
| 2031 Do Minimum | 22592 | 19857 |
| 2031 Town Centre | 16038 | 14798 |
| 2031 Town Centre Link Road Option ½ | 25378 | 28199 |
| 2031 Town Centre Link Road Option 3 | 29861 | 32973 |

The future year of 2017 records minor variations between each of the scenarios. Each future year post 2017 shows a noticeable increase in the variation between the separate scenarios. This is evident in both the morning and evening peak period for 2031. The increase in variation of the total distance travelled illustrates the impact of congestion during each of the future year scenarios.

### *8.7.2 Average Journey Time*

The average journey time shows similar trends to the total distance travelled in both the morning and evening peaks. Using the average journey time values and comparing to a Do-Nothing Scenario it is possible to identify possible increases in congestion across the network. As there is limited route choice within the model, apart from within the 'with Link Road Options', an increase in journey time could indicate an increase in delay and queues across the network. Table 8.7 below presents the total journey time for the central growth Stage 1 Paramics Traffic Models and is also presented graphically in Appendix R, Figure 2.

**Table 8.7 – Average Journey Time for the Central Growth Traffic Models**

| Scenario | Average Journey Time (S) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base Model Network | 129 | 117 |
| 2017 Do-Nothing | 119 | 107 |
| 2017 Do-Minimum | 127 | 123 |
| 2017 Town Centre | 127 | 123 |
| 2017 Town Centre Link Road Option ½ | 116 | 106 |
| 2017 Town Centre Link Road Option 3 | 118 | 107 |
| 2021 Do-Nothing | 126 | 107 |
| 2021 Do-Minimum | 182 | 191 |
| 2021 Town Centre | 139 | 168 |
| 2021 Town Centre Link Road Option ½ | 114 | 117 |
| 2021 Town Centre Link Road Option 3 | 129 | 117 |
| 2024 Do-Nothing | 135 | 126 |
| 2024 Do-Minimum | 280 | 287 |
| 2024 Town Centre | 242 | 261 |
| 2024 Town Centre Link Road Option ½ | 142 | 138 |
| 2024 Town Centre Link Road Option 3 | 141 | 132 |
| 2028 Do-Nothing | 154 | 138 |
| 2028 Do-Minimum | 366 | 426 |
| 2028 Town Centre | 375 | 332 |
| 2028 Town Centre Link Road Option ½ | 186 | 212 |
| 2028 Town Centre Link Road Option 3 | 171 | 190 |
| 2031 Do-Nothing | 174 | 158 |
| 2031 Do-Minimum | 363 | 363 |
| 2031 Town Centre | 278 | 344 |
| 2031 Town Centre Link Road Option ½ | 289 | 323 |
| 2031 Town Centre Link Road Option 3 | 241 | 243 |

The average journey time increases progressively over each future year for the Do-Nothing Scenarios for both the morning and evening peak. The 2012 base year model experiences a higher average journey time than the 2017 Do-Nothing scenario in both peak periods this is as a result the improvements made to the railway crossing on the B1077 Station Road. The Do-Minimum and with Town Centre Improvements both show significant increases in the average journey time for both peak periods from 2024 onwards.

The highest average journey time during the morning peak is approximately 375 seconds in 2028 with Town Centre Improvements scenario and 426 seconds in the 2028 Do-Minimum scenario for the same year. The peaking of these values in 2028 could be as a result of the upgrade of White House Lane to a two way residential street in 2031.

The 2021 and 2024 With Link Road Options both record average journey times comparable to that of the Do-Nothing scenarios in the same years. Post 2024, the 'with Link Road Option's still result in average journey times lower than the Do-Minimum and with Town Centre Improvement scenarios but the times are higher than the Do-Nothing Scenarios.

### *8.7.3 Average Speed*

The average speed can be used to infer possible congestion within the traffic models. As congestion increases within the traffic model, vehicle speeds drop due to increases in delay and queuing. Table 8.8 below presents the average vehicle speeds taken from the central growth Stage 1 Paramics Traffic Models and it is also presented graphically in Appendix R, Figure 2.

**Table 8.8 – Average Vehicle Speeds for Central Growth Traffic Models**

| Scenario | Average Speed (Km/Hr (mph)) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base Model Network | 45 (28) | 40 (25) |
| 2017 Do-Nothing | 48 (30) | 44 (27) |
| 2017 Do-Minimum | 49 (30) | 42 (26) |
| 2017 Town Centre | 51 (32) | 47 (29) |
| 2017 Town Centre Link Road Option ½ | 52 (32) | 49 (30) |
| 2017 Town Centre Link Road Option 3 | 54 (34) | 52 (32) |
| 2021 Do-Nothing | 46 (29) | 46 (29) |
| 2021 Do-Minimum | 38 (24) | 31 (19) |
| 2021 Town Centre | 49 (30) | 36 (22) |
| 2021 Town Centre Link Road Option ½ | 52 (32) | 49 (30) |
| 2021 Town Centre Link Road Option 3 | 55 (34) | 53 (33) |
| 2024 Do-Nothing | 43 (27) | 40 (25) |
| 2024 Do-Minimum | 25 (16) | 19 (12) |
| 2024 Town Centre | 31 (19) | 24 (15) |
| 2024 Town Centre Link Road Option ½ | 49 (30) | 44 (27) |
| 2024 Town Centre Link Road Option 3 | 54 (34) | 51 (32) |
| 2028 Do-Nothing | 38 (24) | 37 (23) |
| 2028 Do-Minimum | 18 (11) | 12 (7) |
| 2028 Town Centre | 17 (11) | 15 (9) |
| 2028 Town Centre Link Road Option ½ | 39 (24) | 30 (19) |
| 2028 Town Centre Link Road Option 3 | 47 (29) | 37 (23) |
| 2031 Do-Nothing | 34 (21) | 33 (21) |
| 2031 Do-Minimum | 17 (11) | 12 (7) |
| 2031 Town Centre | 16 (10) | 9 (6) |
| 2031 Town Centre Link Road Option ½ | 24 (15) | 19 (12) |
| 2031 Town Centre Link Road Option 3 | 34 (21) | 30 (19) |

Table 8.8 on the previous page shows that all scenarios indicate a reduction in the average speed for all future years. The lowest average speed for 2017, 2021 and 2024 are recorded in the Do-Minimum scenarios during the morning peak. The lowest average speed is recorded in all but the 2031 future years for the Do-Minimum scenario. The 'with Town Centre Improvements' recorded the lowest average speed for the future years of 2028 and 2031 in the morning peak and 2031 in the evening peak, indicating an increase in congestion post 2024 and 2028 respectively.

The two with link road options show marked increases in the average vehicle speeds for each scenario for all future years as compared to the Do Minimum and Town Centre Scenarios. The With Link Road Option 3 records the highest average speed of 55 kmh in 2021. Average vehicle speeds for all scenarios show a significant decline from 2028 onwards. Despite this, the 'With Link Road Option 3' in 2031 recorded the same average speed as the Do-Nothing scenarios in the morning peak and just 3 kmh lower in the evening peak. This illustrates the same trend for all future years that the with link road options return average vehicle speeds back to a point better or similar to that of the Do-Nothing scenario.

### *8.7.4 Discussion and Summary*

Analysis of the modelling results indicate that during the future years the average journey times increase for each scenario as does the total distance travelled. Average speeds within the traffic models fall especially post 2028, indicating possible congestion across the network.

Across the summary statistics for each year, there are similar trends which demonstrate the impact of future traffic growth and network changes across Attleborough. The Do-Minimum summary statistics demonstrate that with no network changes average vehicle speeds decline and journey times increase as a result of congestion. The town centre changes have a noticeable effect in 2017 and 2021 but post 2021 the summary statistics illustrate the town centre changes have an increasingly limited mitigating effect on the future years of 2024, 2028 and 2031.

The summary statistics demonstrate that the With Link Road Options have a significant impact in all future years. During 2017, 2021 and 2024 the 'With Link Road' options are forecast to mitigate the impact of the future development and result in network performance similar to that of the Do-Nothing scenarios.

Post 2028, the 'With Link Road Options' still mitigate the impact of the significant increase in forecast traffic. However, by 2031 the network changes struggle to return network performance back to the Do-Nothing scenario levels. The With Link Road Option 3 network is forecast to operate better in all future year scenarios than the With Link Road Option 1/2. This is especially apparently during 2031 when the peak traffic growth is realised.

## 8.8 Stage 2 Outputs and Appraisals

### *8.8.1 Introduction*

Stage 2 used the same traffic models as Stage 1 but updated matrices to reflect a low growth forecast. Therefore the same network summary statistics as Stage 1 have been extracted from the traffic models. The full network summary statistics are presented in Appendix S, Figure 1 to 4.

### *8.8.2 Total Distance Travelled*

The graphs in Appendix S, Figure 1 and
Table 8.9 overleaf illustrate that for each future year scenario there is a progressive increase in the total distance travelled over time. The Do-Nothing scenarios all recorded the lowest distance travelled for each of the future years. The With Link Road Option 3 scenario recorded the highest total distance travelled for each of the future year scenarios.

**Table 8.9 – Total Distance Travelled for the Low Growth Traffic Models**

| Scenario | Total Distance Travelled (km) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base | 10185 | 9917 |
| 2017 Do Nothing | 10003 | 9640 |
| 2017 Do Minimum | 11383 | 11484 |
| 2017 Town Centre | 11208 | 11810 |
| 2017 Town Centre Link Road Option ½ | 11197 | 11491 |
| 2017 Town Centre Link Road Option 3 | 11893 | 12218 |
| 2021 Do Nothing | 10849 | 10725 |
| 2021 Do Minimum | 15612 | 16248 |
| 2021 Town Centre | 15316 | 16470 |
| 2021 Town Centre Link Road Option ½ | 14792 | 15553 |
| 2021 Town Centre Link Road Option 3 | 15856 | 16906 |
| 2024 Do Nothing | 11527 | 11542 |
| 2024 Do Minimum | 19044 | 19160 |
| 2024 Town Centre | 19627 | 20394 |
| 2024 Town Centre Link Road Option ½ | 18220 | 19530 |
| 2024 Town Centre Link Road Option 3 | 19870 | 21747 |
| 2028 Do Nothing | 12331 | 12545 |
| 2028 Do Minimum | 21142 | 20184 |
| 2028 Town Centre | 21479 | 21156 |
| 2028 Town Centre Link Road Option ½ | 22520 | 24618 |
| 2028 Town Centre Link Road Option 3 | 24629 | 27425 |
| 2031 Do Nothing | 12960 | 13445 |
| 2031 Do Minimum | 23100 | 21959 |
| 2031 Town Centre | 17650 | 17820 |
| 2031 Town Centre Link Road Option ½ | 25633 | 28199 |
| 2031 Town Centre Link Road Option 3 | 28747 | 32080 |

The future year of 2017 records minor variations between each of the scenarios. From 2021 onwards for all future years there is a marked increase between the Do-Nothing and other scenarios. Apart from 2024 Town Centre Link Road Option 1/2 and 2031 with Town Centre Improvements the trend is for an incremental increase over the scenarios following the step up from the Do-Nothing Scenarios.

### *8.8.3 Average Journey Time*

The average journey time in both morning and evening peak period for the Do-Nothing scenarios shows a small increase for each of the future years. The average journey time is forecast to increase by approximately 30 seconds between 2017 and 2031 for the Do-Nothing scenarios during both the morning and evening peak period. This is shown overleaf in Table 8.10 overleaf and also presented graphically in Appendix S, Figure 2.

As with the Central Growth Model outputs Table 8.10 below shows that average journey times actually fall between 2012 and the 2017 Do-Nothing scenario. Again this is a result of the impact of automation of the level crossing on network operation. The average journey time in

2031 Town Centre Link Road Option 3 is 201 and 227 seconds for the AM and PM peaks respectively. This compares with 241 and 243 seconds for the Stage 1: Central Growth models for the same scenarios a reduction of 17% and 7% respectively.

**Table 8.10 – Average Journey Time for the Stage 2 Low Growth Traffic Models**

| Scenario | Average Journey Time (S) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base Model Network | 129 | 117 |
| 2017 Do-Nothing | 117 | 106 |
| 2017 Do-Minimum | 125 | 120 |
| 2017 Town Centre | 125 | 120 |
| 2017 Town Centre Link Road Option ½ | 115 | 106 |
| 2017 Town Centre Link Road Option 3 | 118 | 106 |
| 2021 Do-Nothing | 121 | 112 |
| 2021 Do-Minimum | 167 | 175 |
| 2021 Town Centre | 136 | 146 |
| 2021 Town Centre Link Road Option ½ | 125 | 116 |
| 2021 Town Centre Link Road Option 3 | 128 | 117 |
| 2024 Do-Nothing | 125 | 119 |
| 2024 Do-Minimum | 272 | 300 |
| 2024 Town Centre | 210 | 248 |
| 2024 Town Centre Link Road Option ½ | 137 | 131 |
| 2024 Town Centre Link Road Option 3 | 139 | 131 |
| 2028 Do-Nothing | 135 | 127 |
| 2028 Do-Minimum | 345 | 408 |
| 2028 Town Centre | 322 | 348 |
| 2028 Town Centre Link Road Option ½ | 166 | 189 |
| 2028 Town Centre Link Road Option 3 | 162 | 176 |
| 2031 Do-Nothing | 147 | 138 |
| 2031 Do-Minimum | 370 | 429 |
| 2031 Town Centre | 313 | 423 |
| 2031 Town Centre Link Road Option ½ | 270 | 302 |
| 2031 Town Centre Link Road Option 3 | 201 | 227 |

The highest average journey time for both the morning and evening peak period is recorded in the Do-Minimum traffic models for each of the future years. From 2021 onwards the average journey time for the Do-Minimum is over double that of the Do-Nothing scenarios in the same year.

The with Town Centre Improvements show noticeable reductions in the average journey time for the 2021, 2024 and 2028 future years for both the morning and evening peak periods. The 2031 with Town Centre Improvements scenario morning peak also shows a noticeable decline in the average journey time whilst the evening peak still shows a reduction but not as marked.

As with the central growth the With Link Road Option 3 benefits from a lower journey time in all future years compared to the With Link Road Option 1/2. The With Link Road Option 3 in both

the morning and evening peak periods for all future years apart from 2031 record an average journey time within 30 seconds of the Do-Nothing scenario of the same year. This value is forecast to jump to approximately 60 seconds in 2031, illustrating the effects of the additional traffic on the network.

The average journey times for all 2031 scenarios apart from the Do-Nothing do not increase as markedly as the difference between 2024 and 2028. This is due to the upgrade of White House Lane to a two way residential road. The upgrade provides vehicles with an alternative route if required from the B1077 Buckenham Road to connect with Mill Lane and the B1077 Norwich Road east of Attleborough.

### *8.8.4 Average Speed*

The average speeds for the Stage 2 low growth scenarios follow a distinct trend for each of the future years. The average speeds are presented below in Table 8.11.

**Table 8.11- Average Vehicle Speeds for Stage 2 Low Growth Traffic Models**

| Scenario | Average Speed (Km/Hr (mph)) | |
|---|---|---|
| | Morning Peak | Evening Peak |
| 2012 Base Model Network | 45 (28) | 40 (25) |
| 2017 Do-Nothing | 49 (30) | 45 (28) |
| 2017 Do-Minimum | 50 (31) | 44 (27) |
| 2017 Town Centre | 52 (32) | 48 (30) |
| 2017 Town Centre Link Road Option ½ | 53 (33) | 50 (31) |
| 2017 Town Centre Link Road Option 3 | 55 (34) | 53 (33) |
| 2021 Do-Nothing | 48 (30) | 44 (27) |
| 2021 Do-Minimum | 42 (26) | 34 (21) |
| 2021 Town Centre | 50 (31) | 42 (26) |
| 2021 Town Centre Link Road Option ½ | 53 (33) | 50 (31) |
| 2021 Town Centre Link Road Option 3 | 55 (34) | 54 (34) |
| 2024 Do-Nothing | 47 (29) | 42 (26) |
| 2024 Do-Minimum | 27 (17) | 20 (12) |
| 2024 Town Centre | 36 (22) | 26 (16) |
| 2024 Town Centre Link Road Option ½ | 51 (32) | 47 (29) |
| 2024 Town Centre Link Road Option 3 | 55 (34) | 52 (32) |
| 2028 Do-Nothing | 44 (27) | 40 (25) |
| 2028 Do-Minimum | 20 (12) | 13 (8) |
| 2028 Town Centre | 22 (14) | 16 (10) |
| 2028 Town Centre Link Road Option ½ | 44 (27) | 34 (21) |
| 2028 Town Centre Link Road Option 3 | 50 (31) | 41 (25) |
| 2031 Do-Nothing | 41 (25) | 38 (24) |
| 2031 Do-Minimum | 18 (11) | 12 (7) |
| 2031 Town Centre | 16 (10) | 10 (6) |
| 2031 Town Centre Link Road Option ½ | 27 (17) | 22 (14) |
| 2031 Town Centre Link Road Option 3 | 41 (25) | 33 (21) |

Table 8.11 on the previous page illustrates all scenarios indicate a reduction in the average speed for all future years. The lowest average speed is recorded in all but the 2031 future years for the Do-Minimum scenario for both the morning and evening peak period. The with Town Centre Improvements recorded the lowest average speed for the future year of 2031 in both the morning and evening peak, indicating an increase in congestion post 2024 and 2028 respectively.

The two with link road options show marked increases in the average vehicle speeds for each scenario for all future years. The With Link Road Option 3 records the highest average speed of 55 km/h in 2017 and 2024. Average vehicle speeds for all scenarios show a significant decline from 2028 onwards. Despite the With Link Road Option 3 in 2031 recorded the same average speed as the Do-Nothing scenarios in the morning peak and just 5 km/h lower in the evening peak. This illustrates the same trend for all future years in that the with link road options effectively mitigate the forecast growth in traffic arising from new development returning the average vehicle speeds back to a point better or similar to that of the Do-Nothing scenario for the same year.

### *8.8.5 Discussion and Summary*

Analysis of the Stage 2 summary statistics illustrates that the same trends identified within the central growth scenarios are evident within the low growth. The impact upon the network is forecast not to be as marked as the central growth which is indicated by the higher average journey times and lower average speeds.

The future years of 2028 and 2031 Do-Minimum and With Town Centre models scenarios show significant reductions in vehicle speeds and increases in journey time, as in the Stage 1 modelling. Despite the low growth forecasts this demonstrates the impact of congestion on the highway network and how the Town Centre Improvements alone cannot fully mitigate the forecast additional development traffic.

The With Link Road Option 3 is shown to remain the most beneficial network solution of the three Do-Something scenarios modelled. However, the modelling demonstrates that despite this being the most beneficial solution the average journey time still increases by approximately 40 and 90 seconds in 2028 and 2031 respectively. Prior to 2028 the third link road option is shown to mitigate the development traffic returning the network back to the equivalent year Do-Nothing scenario.

## 8.9 Stage 3 Outputs and Appraisals

### *8.9.1 Introduction*

The central growth matrices have been used to derive the demand flows for input into each of the junction models to ensure junction performance is calculated based on the worst case flows. By doing this, the point at which each junction exceeds capacity can be identified. The three separate options for control of each junction (priority, roundabout and traffic signals) in the town centre are presented and analysed for each scenario of the Do-Minimum, Do-Something Town Centre (DS), DS With Link Road Option 1/2 and DS With Link Road Option 3. To provide a point of reference for future schemes all junctions have also been modelled for a Do-Nothing Network (i.e. as existing).

The results for each scenario are summarised so that each of the junctions assessed are presented in a single table where possible. For ease of reference each junction has been numbered as follows:

Junction 1 – Connaught Road / Exchange Street / High Street

Junction 2 – Besthorpe Road / Church Street / Surrogate Street

Junction 3 – Station Road / Thieves Lane / Surrogate Street / Connaught Road

Junction 4 - Queens Road / Exchange Street / Church Street

### *8.9.2 Software*

Analysis of the junctions has been completed in the appropriate software dependant on the junction layout. JUNCTIONS 8 (8.0.1.305) computer program which contains a PICADY and ARCADY module software package has been used for priority and roundabout junctions, whilst LINSIG has been used for modelling the proposed signalised junction layout. Within both pieces of software, various figures indicate junction performance.

ARCADY is used for predicting capacities, queue lengths, delays (both queuing and geometric) and accident risk at roundabouts and priority junctions. The main indicator of performance in ARCADY is the RFC value, this value is the ratio of demand to capacity for the junction. A value of **0.85** is generally considered to represent capacity rather than a value of 1; this is to allow for daily and seasonal traffic variations in traffic which may occur. The RFC value is not always the best indicator of performance at a junction and therefore both the Delay per PCU and Queue Length will also be analysed when discussing junction performance.

LINSIG is used for predicting capacities, queue lengths, delays and signal specifications at signalised junctions. The main indicator of performance in LINSIG is the Degree of Saturation (DoS). A movement experiencing a value of over **90%** is generally considered to be over capacity. However, in certain congested networks values greater than 100% are acceptable when viewed in conjunction with the mean max queue (MMQ) values and the average delay per vehicle.

## 8.10 Do-Nothing Network Junction Assessments

### *8.10.1 Do- Nothing Network – Junction Capacity (RFC Values)*

RFC values for the existing junctions are presented in Table 8.12 below and Table 8.13 overleaf and Appendix T, Figures 1 to 4.

**Table 8.12 – Do-Nothing Am Peak Forecast RFC Values**

| Junction | 2 | | | 3 | | | 4 |
|---|---|---|---|---|---|---|---|
| Future Year | Besthorpe Road | Church Street (Left & Ahead) | Church Street (Right & Ahead) | Thieves Lane (Left & ahead) | Thieves Lane (Right & ahead) | Station Road | Queens Road |
| **2012** | 0.1 | 0.45 | 0.9 | 0.26 | 0.07 | 0.63 | 0.44 |
| **2017** | 0.11 | 0.37 | 0.88 | 0.26 | 0.07 | 0.68 | 0.36 |
| **2021** | 0.99 | 0.94 | 0.99 | 0.32 | 0.07 | 0.78 | 0.45 |
| **2024** | 1.07 | 1.07 | 1.07 | 0.31 | 0.08 | 0.81 | 0.49 |
| **2028** | 1.17 | 1.16 | 1.17 | 0.36 | 0.08 | 0.9 | 0.55 |
| **2031** | 1.22 | 1.22 | 1.22 | 0.39 | 0.09 | 0.94 | 0.56 |

**Table 8.13 – Do-Nothing Pm Peak Forecast RFC Values**

| Junction | 2 | | | 3 | | | 4 |
|---|---|---|---|---|---|---|---|
| Future Year | Besthorpe Road | Church Street (Left & Ahead) | Church Street (Right & Ahead) | Thieves Lane (Left & ahead) | Thieves Lane (Right & ahead) | Station Road | Queens Road |
| **2012** | 0.04 | 0.7 | 0.97 | 0.26 | 0.09 | 0.85 | 0.45 |
| **2017** | 0.05 | 0.52 | 0.89 | 0.08 | 0.06 | 0.88 | 0.4 |
| **2021** | 0.04 | 1.01 | 1.01 | 0.32 | 0.07 | 1.1 | 0.52 |
| **2024** | 0.05 | 1.12 | 1.12 | 0.31 | 0.08 | 1.17 | 0.56 |
| **2028** | 0.05 | 1.21 | 1.21 | 0.36 | 0.08 | 1.29 | 0.6 |
| **2031** | 0.07 | 1.27 | 1.27 | 0.39 | 0.09 | 1.35 | 0.63 |

The forecast RFC values in Table 8.12 and Table 8.13 above illustrates during the morning peak period the junctions of Norwich Road / Besthorpe Road / Surrogate Street / Church and Surrogate Street / Thieves Lane / Station Road / Connaught Road exceeds capacity in 2017. Only the junction of Queens Road / Church Street / Exchange Street operates with spare capacity during all future year scenarios. The highest RFC value of 1.35 is experienced on Station Road during the evening peak period.

The junction of Exchange Street / Connaught Road / High Street in the Do-Nothing network will be signalised prior to the first future year of 2017 as a result of the mixed use development on London Road, therefore it is assessed in the software LINSIG. However, in order to provide a reference point the junction has been assessed in Junctions 8 (PICADY) for just 2012, the results are presented below in Table 8.14.

**Table 8.14 – Junction 1 2012 Base Year Am and Pm Peak Forecast RFC Values**

| | AM | PM |
|---|---|---|
| **High Street** | 0.81 | 0.77 |

The model output indicates the junction operates with a small amount of spare capacity during the base year. The LINSIG outputs for each of the future years are presented below in Table 8.15.

**Table 8.15 – Do-Nothing Forecast Degree of Saturation for Junction 1: Exchange Street / Connaught Road / High Street**

| Arm | Am | | | Pm | | |
|---|---|---|---|---|---|---|
| | High St | Connaught Road Straight On | Connaught Road Right Turn | High St | Connaught Road Straight On | Connaught Road Right Turn |
| 2017 | 71.9% | 26.1% | 71.4% | 76.4% | 38.7% | 75.4% |
| 2021 | 81.6% | 29.8% | 82.9% | 84.5% | 42.1% | 84.4% |
| 2024 | 84.7% | 31.6% | 85.5% | 89.8% | 45.6% | 90.8% |
| 2028 | 90.2% | 33.0% | 92.5% | 96.6% | 48.6% | 97.9% |
| 2031 | 93.6% | 35.3% | 95.9% | 102.8% | 50.4% | 102.0% |

Table 8.15 on the previous page illustrates that during the 2024 PM peak, the junction exceeds operational capacity. During the morning peak period, the junction operates with spare capacity until the future year of 2028. Vehicle movements from High Street and Connaught Road reach an RFC of 100% capacity during the evening peak of 2031.

### *8.10.2 Do-Nothing Network - Queue Lengths*

Whilst the RFC is an indicator of the junction performance, the forecast length of queue is also a valuable indicator of performance taken from the traffic modelling. All queue graphs for the do nothing network are presented in Appendix S, Figures 1 to 4. These graphs also relate queue lengths to distances upstream and features such as junctions, pedestrian crossings and bus stops which would be adversely impacted by the queues forming.

The queue graphs illustrate that Besthorpe Road, Thieves Lane and Queens Road are forecast not to experience significant queues in all of the future year scenarios. Queues on both Church Street and Connaught Road are forecast to exceed the length of the links in the future year 2024 during both peak periods. Station Road is forecast to experience a significant queue during the evening peak period in all future years. The queue on Station Road during the morning peak in all future year scenarios is forecast not to reach beyond the level crossing. The queue on High Street is forecast to reach past the pedestrian crossing in the future year of 2028.

The forecast queue lengths will result in stationary traffic on Church Street through the town centre and Connaught Road. Queuing traffic on Church Street will have an impact on the upstream junctions of Queens Road / Church Street / Exchange Street and possibly the Exchange Street / Connaught Road / High Street Junction.

### *8.10.3 Do-Nothing Network - Delay*

Delay graphs are also presented in Appendix T, Figures 1 to 4. The results demonstrate there are significant delays to vehicles on Church Street and High Street arms of corresponding junctions. The remaining arms of junctions in all future year scenarios do not experience significant delays, the greatest being Station Road with 65 seconds in 2031.

## 8.11 Do-Minimum Network - Junction Assessments

### *8.11.1 Do-Minimum Network – Junction Capacity (RFC Values)*

The Do-Minimum network, Central Growth models which include all development but only committed network changes have been used to derive the demand flows for each junction. This has been chosen as it is considered the worst case scenario for traffic impact. RFC values for the existing junctions are presented in Table 8.16 and Table 8.17 overleaf and in Appendix T, Figures 1 to 4.

**Table 8.16 – Do-Minimum Am Peak Forecast RFC Values**

| Junction | 2 | | | 3 | | | 4 |
|---|---|---|---|---|---|---|---|
| Future Year | Besthorpe Road | Church Street (Left & Ahead) | Church Street (Right & Ahead) | Thieves Lane (Left & ahead) | Thieves Lane (Right & ahead) | Station Road | Queens Road |
| **2017** | 0.09 | 0.56 | 0.93 | 0.3 | 0.07 | 0.94 | 0.41 |
| **2021** | 0.09 | 1.25 | 1.25 | 0.34 | 0.08 | 1.28 | 0.65 |
| **2024** | 0.11 | 1.6 | 1.6 | 0.41 | 0.1 | 1.96 | 0.89 |
| **2028** | 0.08 | 1.91 | 1.91 | 0.55 | 0.18 | 2.41 | 1.09 |
| **2031** | 0.29 | 2.23 | 2.23 | 0.78 | 0.59 | 3.24 | 1.42 |

**Table 8.17 – Do-Minimum Pm Peak Forecast RFC Values**

| Junction | 2 | | | 3 | | | 4 |
|---|---|---|---|---|---|---|---|
| Future Year | Besthorpe Road | Church Street (Left & Ahead) | Church Street (Right & Ahead) | Thieves Lane (Left & ahead) | Thieves Lane (Right & ahead) | Station Road | Queens Road |
| **2017** | 0.06 | 1.06 | 1.06 | 0.12 | 0.09 | 1.31 | 0.6 |
| **2021** | 0.05 | 1.52 | 1.52 | 0.15 | 0.1 | 1.6 | 0.88 |
| **2024** | 0.07 | 2.04 | 2.04 | 0.23 | 0.14 | 2.13 | 1.28 |
| **2028** | 0.1 | 2.66 | 2.66 | 0.5 | 0.36 | 2.42 | 1.81 |
| **2031** | 0.11 | 2.5 | 2.5 | 1.08 | 1.06 | 3.38 | 1.91 |

The RFC values presented in Table 8.16 and Table 8.17 above illustrate that all three junctions have arms that exceed capacity during the future year 2024 evening peak. The highest RFC value of 3.38 is experienced on the Station Road arm of the Surrogate Street / Thieves Lane / Station Road / Connaught Road junction.

The Degrees of Saturation (DoS) for the junction of Exchange Street / Connaught Road / Exchange Street is shown in Table 8.18 overleaf. The Do-Minimum LINSIG model reflects the committed changes at the junction which retains the existing one-way system but introduces signal control at the junction. This differs from the Do Something LINSIG models which account for the introduction of two-way movements on Connaught Road.

**Table 8.18 – Forecast Degree of Saturation for Junction 1:Exchange Street / Connaught Road**

| Peak Period | Am | | | Pm | | |
|---|---|---|---|---|---|---|
| Future Year | High St | Connaught Road Straight On | Connaught Road Right Turn | High St | Connaught Road Straight On | Connaught Road Right Turn |
| 2017 | 84.10% | 25.80% | 80.10% | 84.3% | 44.10% | 85.00% |
| 2021 | 101.00% | 37.00% | 102.90% | 105.30% | 54.70% | 104.80% |
| 2024 | 126.10% | 50.70% | 123.60% | 124.00% | 64.90% | 124.10% |
| 2028 | 140.40% | 64.00% | 142.90% | 138.50% | 75.50% | 141.70% |
| 2031 | 161.80% | 77.20% | 163.60% | 151.90% | 95.10% | 155.40% |

Table 8.18 above illustrates the right turn movements from High Street and Connaught Road exceed capacity in the future year of 2021. The ahead movement from Connaught Road does not exceed capacity in any of the future years.

### *8.11.2 Do-Minimum Network - Queue Lengths*

Queue length graphs presented in Appendix T, Figures 1 to 4 illustrate that Station Road, Thieves Lane, High Street and Church Street are forecast to experience queues which exceed the length of each link in all future years, for instance, impacting on the operation of upstream junctions. Connaught Rd and Queens Road are forecast to experience queues which exceed the length of the links in 2024.

### *8.11.3 Do-Minimum Network - Delay*

Graphs of delay per PCU for each arm of the town centre network are presented in Appendix T, Figures 1 to 4. Station Road is forecast to experience significant delay for both peak periods in all future years. Church Street will experience significant delays from 2021 onwards. Besthorpe Road shows no significant delay during any of the future years. Thieves lane will not experience significant delay until 2031 when the delay per PCU will peak at 7 minutes 39 seconds during the evening peak. High Street will begin to experience an increase in delay in 2021 but it isn't until 2024 when the delay becomes significant exceeding three minutes.

### *8.11.4 Do-Minimum Network - Summary*

Analysis of the Do-Minimum central growth demand flow junction models indicates that the saturation point for all junctions is exceeded in 2017. Queues on one or more arms of each of the four junctions in 2017 exceed a point which would result in queuing vehicles blocking back across other junctions. Whilst these models are essentially based on the higher central growth demands assuming an unconstrained network the results suggest that mitigation measures are required at each of the junctions by 2017 as a consequence of the development proposals.

## 8.12 Do Something with Town Centre Improvements Network (No Link Road) Junction Assessments

### *8.12.1 Introduction*

Despite the various options for junction control the town centre improvements will contain similarities. Both Connaught Road and Surrogate Street will revert to two way running. The three different junction control methods of Priority, Roundabout and Signals will be reported on individually. A preferred option which might result in three separate types of control for the junctions will be drawn from the overall analysis.

It is proposed that the junction of Queens Road / Church Street / Exchange Street will remain unchanged. Given the location of the town centre war memorial at the heart of the junction and the good pedestrian links across the junction no changes are proposed for the junction. Whilst no changes are proposed at the junction it is important to understand the impact of the changes elsewhere upon the junction. Therefore it has been modelled in each of the scenarios as part of the priority junction sections.

All junctions have been modelled in accordance with the drawings presented in Appendix EE to HH.

### 8.12.2 *Priority Control – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.19 and Table 8.20 below and graphically in Appendix U, Figures 1 to 4.

**Table 8.19 - Forecast RFC Am Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'thorpe Road | Church Street | Station Road to C'naught Rd | Surrogate St to C'naught Rd | C'naught Rd All |
| 2017 | 0.49 | 0.31 | 0.21 | 0.72 | 0.35 | 0.88 | 0.91 |
| 2021 | 0.96 | 0.62 | 0.25 | 1.06 | 0.68 | 1.08 | 1.66 |
| 2024 | 1.14 | 0.88 | 0.27 | 1.53 | 1.16 | 1.25 | 3.37 |
| 2028 | 1.68 | 1.19 | 0.53 | 2.28 | 1.77 | 1.58 | - |
| 2031 | 2.14 | 1.6 | 0.98 | 2.61 | 2.36 | 1.75 | - |

**Table 8.20 – Forecast RFC Pm Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'thorpe Road | Church Street | Station Road to C'naught Rd | Surrogate St to C'naught Rd | C'naught Rd All |
| 2017 | 0.54 | 0.26 | 0.12 | 1.01 | 0.79 | 1.05 | 0.51 |
| 2021 | 0.78 | 0.6 | 0.15 | 2.62 | 1.18 | 1.3 | 1.6 |
| 2024 | 1.19 | 0.83 | 0.31 | 4.12 | 1.59 | 1.47 | 4.91 |
| 2028 | 1.77 | 1.14 | 1.12 | 6.84 | 2.16 | 1.78 | - |
| 2031 | - | 1.41 | 5.29 | 7.18 | 2.62 | 1.82 | - |

Table 8.19 and Table 8.20 above demonstrate the junctions of Surrogate Street / Thieves Lane / Station Road / Connaught Road and Norwich Road / Besthorpe Road / Surrogate Street / Church Street operate over capacity from 2017 onwards. The results suggest additional mitigation would be required from 2017 to further improve the operation of the junctions. The junction of Exchange Street / Connaught Road / High Street is forecast to reach capacity in 2021 and so would require additional mitigation post 2021. The highest RFC is experienced on Church Street during the 2031 PM peak.

Table 8.21 overleaf presents the forecast RFC values for the Queens Road / Church Street / Exchange Street junction and demonstrates that the Queens Road arm of the Queens Road / Church Street / Exchange Street junction exceeds capacity during the evening peak in 2028 with the town centre changes.

**Table 8.21 – Forecast RFC for both peak periods at the junction of Queens Road / Church Street / Exchange Street**

| Peak Period | Am | Pm |
|---|---|---|
| 2017 | 0.38 | 0.44 |
| 2021 | 0.44 | 0.54 |
| 2024 | 0.55 | 0.73 |
| 2028 | 0.56 | 0.95 |
| 2031 | 0.74 | 1.16 |

### *8.12.3 Priority Control - Queue Lengths*

Queue length graphs presented in Appendix U, Figures 1 to 4 indicate the junction of Exchange Street / Connaught Road / High Street does not experience a significant queue until 2024. Beyond 2024 the queue on High Street is forecast to reach beyond Hargham Road and the queue on Connaught Rd arm will reach back to Station Road.

The Station Road and Surrogate Street arms of the Surrogate Street / Thieves Lane / Surrogate Street / Connaught Road are forecast to experience queues in excess of their link length in all future years. Vehicles are forecast to queue beyond Thieves Lane in 2028.

Operating as a priority junction the Church Street arm of the Norwich Road / Besthorpe Road / Surrogate Street / Church Street is forecast to experience a queue beyond its length in all future years during the evening peak.

The queue on Queens Road exceeds the length of the link in 2031 with the Town Centre Improvements. The peak queue is forecast to exceed 650m in length. The morning peak is forecast to experience a queue no greater than 20m in length.

### *8.12.4 Roundabout Junctions – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.22 below and Table 8.23 overleaf and graphically in Appendix V, Figure 1 to 4.

**Table 8.22 - Forecast RFC Am Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | High St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| **2017** | 0.75 | 0.85 | 0.67 | 0.66 | 0.76 | 0.77 | 1.13 | 0.61 |
| **2021** | 0.98 | 1.21 | 1.02 | 0.86 | 0.96 | 1.13 | 1.45 | 0.8 |
| **2024** | 1.04 | 1.63 | 1.35 | 1.02 | 1.09 | 1.6 | 1.77 | 0.84 |
| **2028** | 1.21 | 2.19 | 1.59 | 1.2 | 1.3 | 2.1 | 2.27 | 1.01 |
| **2031** | 1.39 | 2.68 | 1.82 | 1.16 | 1.39 | 2.34 | 2.64 | 1.06 |

**Table 8.23 - Forecast RFC Pm Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | High St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| 2017 | 0.58 | 1.31 | 0.73 | 0.74 | 0.77 | 1.45 | 0.95 | 0.46 |
| 2021 | 0.76 | 1.71 | 1.14 | 0.9 | 1.04 | 1.83 | 1.32 | 0.61 |
| 2024 | 0.95 | 2.05 | 1.57 | 1.06 | 1.29 | 2.11 | 1.77 | 0.8 |
| 2028 | 1.14 | 2.52 | 1.99 | 1.26 | 1.49 | 2.53 | 2.37 | 1.02 |
| 2031 | 1.35 | 2.89 | 2.45 | 1.16 | 1.51 | 2.51 | 2.76 | 1.12 |

The model results presented in Table 8.22 and Table 8.23 above indicate a roundabout layout would result in all junctions operating over capacity in all future years with the exception of junction 2 in 2017. The highest RFC is forecast on the Surrogate Street arm of the Surrogate Street / Thieves Lane / Station Road / Connaught Road arm junction. Besthorpe Road is the only arm of any junction not to exceed capacity in all future years; this is not presented in Table 8.22 above.

The roundabout layouts would require further mitigation measures to prevent severe delays on the town centre highway network.

### 8.12.5 *Roundabout Junctions - Queue Lengths*

Queue length graphs presented in Appendix V, Figure 1 to 4 illustrate that Connaught Road westbound, Station Road, Surrogate Street (both directions) Church Street and Norwich Road are forecast to experience a queue longer than their length in all future year scenarios. The forecast queues on all six arms are of significant length reaching into thousands metres plus. The roundabout layouts would result in queues across the town centre network and hinder vehicle movements into and out of the town centre.

### 8.12.6 *Traffic Signal Control – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.24 to Table 8.27 below/overleaf and graphically in Appendix W, Figure 1 to 4.

**Table 8.24 - Forecast Degree of Saturation for Am Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 63.1% | 69.6% | 12.9% | 70.6% | 43.5% |
| 2021 | 84.3% | 86.4% | 17.6% | 87.1% | 43.4% |
| 2024 | 102.4% | 101.7% | 16.9% | 104.5% | 39.0% |
| 2028 | 120.3% | 122.2% | 19.5% | 120.0% | 56.7% |
| 2031 | 114.4% | 130.8% | 22.5% | 134.8% | 80.6% |

**Table 8.25 - Forecast Degree of Saturation for Am Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 56.7% | 87.6% | 86.8% | 21.4% |
| 2021 | 88.0% | 109.1% | 107.6% | 24.2% |
| 2024 | 127.2% | 126.1% | 127.4% | 28.0% |
| 2028 | 168.7% | 150.8% | 166.8% | 34.1% |
| 2031 | 191.4% | 170.5% | 193.3% | 42.4% |

**Table 8.26 - Forecast Degree of Saturation for Pm Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 73.10% | 71.1% | 13.3% | 70.5% | 22.6% |
| 2021 | 92.2% | 93.2% | 18.3% | 93.5% | 22.6% |
| 2024 | 108.2% | 117.9% | 23.7% | 118.0% | 29.7% |
| 2028 | 130.7% | 143.8% | 29.2% | 140.8% | 46.8% |
| 2031 | 120.8% | 152.5% | 41.0% | 155.3% | 85.5% |

**Table 8.27 - Forecast Degree of Saturation for Pm Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 80.0% | 76.6% | 80.0% | 16.7% |
| 2021 | 109.9% | 101.7% | 106.5% | 18.1% |
| 2024 | 141.3% | 129.7% | 139.4% | 19.0% |
| 2028 | 184.3% | 160.3% | 180.8% | 25.2% |
| 2031 | 199.6% | 190.7% | 192.5% | 35.3% |

Table 8.24 to Table 8.27 above illustrate that both junctions exceed capacity in the future year 2021. The highest DoS is forecast for all movements from Station Road with its junction with Surrogate Street / Thieves Lane / Connaught Road. The Church Street, Thieves Lane and Besthorpe Road arms of either junction are not forecast to reach capacity within any future year. The results suggest under signal control the town centre junctions will not require further intervention prior to 2021. However post 2021 the junctions begin to operate over capacity and will require the need for further measures.

The forecast DoS for the signalised junction of Exchange Street / Connaught Road / High Street is presented overleaf in Table 8.28.

**Table 8.28 - Forecast Degree of Saturation for Peak Periods for Signalised Junction of Exchange Street / Connaught Road / High Street**

| Junction | Am | | Pm | |
|---|---|---|---|---|
| Future Year | High St | Connaught Rd Ahead Right | High St | Connaught Rd Ahead Right |
| 2017 | 85.9% | 87.3% | 101.8% | 102% |
| 2021 | 114.7% | 118% | 132.1% | 132.7% |
| 2024 | 142.8% | 140.2% | 162.5% | 160% |
| 2028 | 180.9% | 179.5% | 191.1% | 196.7% |
| 2031 | 213.8% | 215.3% | 225.2% | 225.8% |

Table 8.28 above identifies the signalised junction of Exchange Street / Connaught Road / High Street operates over capacity from the future year 2021 onwards in the morning peak and all future years during the evening peak. The highest DoS is experienced by vehicle movements from Connaught Road. Whilst the junction is shown to operate over capacity in the 2017 peak period it is important to also understand the level of queuing at the junction in 2017.

### *8.12.7 Traffic Signal Control - Queue Lengths*

Based on the demand flows it is forecast that the Surrogate Street northbound, Norwich Road southbound and Church Street arms of the town centres northern junction will experience queues which will exceed the length of their links between 2021 and 2024. Queues of this length between 2021 and 2024 would impact upon the operation of other junctions and begin to detract from the town centre environment. The largest queue at this junction is forecast to reach approximately 1279m along Norwich Road in 2031. Such a queue would reach back to and hinder movements from the A11 off slips. This is shown in Appendix W, Figure 1 to 4.

Operating under signal control the junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road is forecast to experience queues greater than the length of each link on all arms in 2021. Queues vary in length with the longest of approximately 3624m on Station Road in the future year of 2031 and the shortest being 1400m on Connaught Road in the future year of 2031.

The junction of Exchange Street / Connaught Road / High Street is shown to be over capacity in 2017. However the junction is forecast to experience a queue on High Street which would block the entrance / exit of Sainsbury's in the evening peak of 2021. This suggests whilst the arm of the junction is shown to operate over capacity in 2017 it will not result in a significant impact until 2021.

The Connaught Road arm of the Exchange Street / Connaught Road / High Street junction is forecast to operate over capacity in 2017 but the queue will not exceed the length of the link until the evening peak of 2024. The junction is forecast to experience a peak queue of 344m on High Street and 735m on Connaught Road in the evening peak of 2031.

### *8.12.8 Do-Something with Town Centre Improvements - Summary*

Analysis of the different methods of control for each junction as part of the Do-Something with Town Centre central growth demand flow junction models identifies varying degrees of performance for each junction layout.

The results suggest for the Do-Something with Town Centre Improvements scenario traffic signals best mitigate the impacts of increased traffic demands at all but the Exchange Street / Connaught Road / High Street junctions until 2021. The Exchanges Street / Connaught Road / High Street junction under priority control will not reach capacity until 2024. However, further

analysis of the queue length data suggests under either traffic signal control or a priority arrangement the junction will experience similar levels of queuing.

Post 2021 it is forecast all junction layouts would result in queues at each of the town centre junctions which would block through and impact upon other junctions and highway features upstream and result in a break down in traffic flow around the town centre. This would detract from the town centre environment and have detrimental impacts for the town as a whole.

## 8.13 Town Centre Improvements – With Link Road Option 1/2

### *8.13.1 Introduction*

The proposed Link Road would be a major piece of infrastructure within Attleborough and have an impact on traffic volumes in the town centre. To understand the likely impact of the Link Road on the town centre junctions the junction models have been ran with the demand flows taken from the S-Paramics model which contains the With Link Road Option 1/2. This section presents the outputs from the traffic models.

### *8.13.2 Priority Control - Junction Capacity*

RFC values for the priority junctions are presented in Table 8.29, Table 8.30 and Table 8.31 below and graphically in Appendix X, Figure 1 to 4.

**Table 8.29 - Forecast RFC Am Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'horpe Road | Church Street | Station Road to C'naught Rd | S'gate St to C'naught Rd | C'naught Rd all Movements |
| **2017** | 0.41 | 0.32 | 0.18 | 0.52 | 0.23 | 0.81 | 0.6 |
| **2021** | 0.57 | 0.4 | 0.26 | 0.78 | 0.32 | 1.04 | 1.04 |
| **2024** | 0.76 | 0.42 | 0.31 | 1.06 | 0.44 | 1.25 | 1.76 |
| **2028** | 1.13 | 0.5 | 0.46 | 1.57 | 0.62 | 1.57 | 11.38 |
| **2031** | 1.67 | 0.56 | 0.71 | 1.9 | 1.1 | 1.74 | - |

**Table 8.30 – Forecast RFC Pm Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'horpe Road | Church Street | Station Road to C'naught Rd | S'gate St to C'naught Rd | C'naught Rd Movements |
| **2017** | 0.4 | 0.24 | 0.16 | 0.87 | 0.42 | 1.06 | 0.42 |
| **2021** | 0.58 | 0.4 | 0.26 | 1.16 | 0.32 | 1.05 | 1.05 |
| **2024** | 0.72 | 0.34 | 0.23 | 3.02 | 0.7 | 1.46 | 2.21 |
| **2028** | 1.04 | 0.39 | 0.69 | 4.74 | 0.93 | 1.76 | - |
| **2031** | 1.6 | 0.44 | 1.87 | 5.9 | 1.33 | 1.89 | - |

Table 8.29 and Table 8.30 above demonstrate the junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road operates over capacity from 2021 onwards. The junctions of

Norwich Road / Besthorpe Road / Surrogate Street / Church Street and Exchange Street / Connaught Road / High Street reach capacity in 2024. The highest RFC is experienced on Church Street during the 2031 Pm peak.

Compared to the without link road option the RFC vales are reduced across all years. This suggests the link road relives some pressure from the town centre by providing an alternative route for vehicles. Operating under priority control the with link road delays when the junctions reach capacity. However, the junctions still reach capacity in 2024 with a remaining 7 years of the study period.

Table 8.31 below presents the forecast RFC values for the Queens Road / Church Street / Exchange Street junction.

**Table 8.31 – Forecast RFC for both peak periods at the junction of Queens Road / Church Street / Exchange Street**

| Peak Period | Am | Pm |
|---|---|---|
| 2017 | 0.23 | 0.32 |
| 2021 | 0.29 | 0.29 |
| 2024 | 0.36 | 0.55 |
| 2028 | 0.44 | 0.7 |
| 2031 | 0.59 | 0.96 |

The Queens Road arm of the Queens Road / Church Street / Exchange Street junction exceeds capacity during the evening peak in 2031 with the town centre changes and the link road option1/2. Compared to the with Town Centre improvements scenario (no link road) the Town Centre Improvements with Link Road Option1/2 is forecast to delay when the junction reaches capacity.

### *8.13.3 Priority Control - Queue Lengths*

Queue length graphs presented in Appendix X, Figure 1 to 4 indicate the junction of Exchange Street / Connaught Road / High Street does not experience a queue of significant proportion until 2028. Beyond 2028 the queue on Connaught Road is forecast to reach back to Station Road. The queue upon High Street will not exceed 10m in length during either peak period.

The Connaught Road and Surrogate Street arms of the Surrogate Street / Thieves Lane / Surrogate Street / Connaught Road are forecast to experience queues in excess of their length from 2024. Vehicles queuing beyond the length of Connaught Road and Surrogate Street would impact on other junctions upstream and result in increased queues at other junctions. Vehicles are forecast to queue beyond Thieves Lane and block vehicle movements on Besthorpe Road in 2028.

Operating as a priority junction the Church Street arm of the Norwich Road / Besthorpe Road / Surrogate Street / Church Street is forecast to experience a queue beyond its length from 2024 during both peak periods.

The queue on Queens Road is forecast to exceed the length of the link in 2031 with the Town Centre Improvements with the Link Road Option1/2. The evening peak queue is forecast to be over 90m in length; the morning peak is forecast to experience a queue no greater than 12m in length.

### 8.13.4 *Roundabout Junctions – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.32 and Table 8.33 below and graphically in Appendix Y, Figure 1 to 4.

**Table 8.32 - Forecast RFC Am Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | High St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| 2017 | 0.66 | 0.71 | 0.53 | 0.6 | 0.65 | 0.64 | 0.96 | 0.5 |
| 2021 | 0.83 | 0.91 | 0.78 | 0.79 | 0.86 | 0.83 | 1.22 | 0.63 |
| 2024 | 0.9 | 1.08 | 1 | 0.93 | 1.02 | 1.07 | 1.43 | 0.73 |
| 2028 | 1.01 | 1.36 | 1.27 | 1.13 | 1.27 | 1.36 | 1.77 | 0.8 |
| 2031 | 1.09 | 1.85 | 1.58 | 1.07 | 1.27 | 1.62 | 2 | 0.77 |

**Table 8.33 - Forecast RFC Pm Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | High St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| 2017 | 0.54 | 1.01 | 0.65 | 0.7 | 0.72 | 0.84 | 0.89 | 0.46 |
| 2021 | 0.83 | 0.92 | 0.78 | 0.79 | 0.87 | 1.07 | 1.23 | 0.63 |
| 2024 | 0.72 | 1.38 | 1.27 | 1 | 1.2 | 1.52 | 1.41 | 0.64 |
| 2028 | 0.81 | 1.65 | 1.61 | 1.2 | 1.46 | 1.81 | 1.75 | 0.67 |
| 2031 | 0.94 | 2.04 | 2.41 | 1.21 | 1.42 | 2.02 | 1.93 | 0.74 |

The model results presented in Table 8.32 and Table 8.33 above indicate a roundabout layout would result in all junctions operating over capacity from 2021 onwards. The highest RFC is forecast for the Church Street arm of the Norwich Road / Besthorpe Road / Connaught Road / Church Street junction. Besthorpe Road is the only arm of any junction not to exceed capacity in all future years. If roundabout layouts were adopted in future years, additional mitigation measures are likely to be required to prevent severe delays within the town centre.

### 8.13.5 *Roundabout Junctions - Queue Lengths*

Queue length graphs presented in Appendix Y, Figure 1 to 4 illustrate that Connaught Road westbound, Station Road, Surrogate Street (both directions) Church Street and Norwich Road are forecast to experience a queue longer than their length from 2021 onwards. Apart from Besthorpe Road and Connaught Road the queues on the other arms of the junctions are of significant length forecasted to reach into thousands metres plus. Such queues would result in severe delays within Attleborough town centre.

### 8.13.6 *Traffic Signal Control – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.34, Table 8.36, Table 8.36 and Table 8.37 overleaf and graphically in Appendix Z, Figure 1 to 4.

**Table 8.34 - Forecast Degree of Saturation for Am Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 54.1% | 60% | 16.3% | 59.1% | 39.6% |
| 2021 | 72.3% | 77.4% | 18.5% | 74.4% | 47.3% |
| 2024 | 86% | 89.1% | 20.3% | 87% | 53.4% |
| 2028 | 101.1% | 108.1% | 25.1% | 103.7% | 51.9% |
| 2031 | 103.1% | 118.2% | 25.9% | 117.3% | 83.5% |

**Table 8.35 - Forecast Degree of Saturation for Am Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 45.2% | 73.5% | 74.5% | 23.4% |
| 2021 | 58.3% | 93% | 92.2% | 28% |
| 2024 | 74.4% | 106.6% | 105.9% | 28.7% |
| 2028 | 94.2% | 127.4% | 125.7% | 37% |
| 2031 | 113.1% | 144.7% | 136.2% | 45% |

**Table 8.36 - Forecast Degree of Saturation for Pm Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 66.8% | 66.6% | 12.9% | 67% | 32.3% |
| 2021 | 72.3% | 77.4% | 16.6% | 75.7% | 47.3% |
| 2024 | 96.3% | 105% | 25.7% | 101.5% | 29.1% |
| 2028 | 110.3% | 127.1% | 36.4% | 125.9% | 42.8% |
| 2031 | 123.3% | 140.3% | 40.8% | 137.5% | 68.6% |

**Table 8.37 - Forecast Degree of Saturation for Pm Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 59.6% | 72.7% | 71.8% | 15.2% |
| 2021 | 58.3% | 93.6% | 92.2% | 28% |
| 2024 | 85.8% | 106.4% | 106.6% | 27.3% |
| 2028 | 106.5% | 128.6% | 126.8% | 34.4% |
| 2031 | 121.2% | 144.7% | 141.3% | 38.5% |

Table 8.34 to Table 8.37 above illustrates that both junctions exceed capacity in the future year 2024. This is in contrast to the Town Centre Improvements Scenario where the junctions exceeded capacity in 2021. The highest DoS is experienced on Surrogate Street for all movements with its junctions with Surrogate Street / Thieves Lane / Connaught Road. The Church Street, Thieves Lane and Besthorpe Road arms of either junction are not forecast to reach capacity within any future year.

The forecast DoS for the signalised junction of Exchange Street / Connaught Road / High Street is presented below in Table 8.38.

**Table 8.38 - Forecast Degree of Saturation for Peak Periods for Signalised Junction of Exchange Street / Connaught Road / High Street**

| Junction | Am | | Pm | |
|---|---|---|---|---|
| Future Year | High St | Connaught Rd Ahead Right | High St | Connaught Rd Ahead Right |
| 2017 | 75.3% | 75.4% | 83.1% | 84.4% |
| 2021 | 92.4% | 94% | 92.4% | 94.8% |
| 2024 | 103% | 105.2% | 113% | 112.6% |
| 2028 | 126.1% | 123.1% | 131% | 131.4% |
| 2031 | 150% | 155.9% | 155.5% | 160% |

Table 8.38 above identifies the signalised junction of Exchange Street / Connaught Road / High Street is forecast to operate over capacity from 2021 onwards in both peak periods all future years. The highest DoS is experienced by vehicle movements from Connaught Road.

### *8.13.7 Traffic Signal Control - Queue Lengths*

Operating under signal control the junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street is forecast to experience queues greater than the length of Norwich Road and Surrogate Street in the future years of 2024 and 2028 respectively. Queues vary in length with the longest reaching approximately 1032m on Norwich Road in the future year of 2031 and the shortest being approximately 32m on Besthorpe Road in the future year of 2031.

Based on the demand flows it is forecast the Surrogate Street northbound arm of the town centre northern junction are forecast to experience a queue which will block back through the junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road in 2021 and 2024. Station Road and Connaught Road are forecast to experiences queues beyond their lengths in 2028. The queue on Surrogate Street is forecast to be the longest reaching approximately 1936m in length back along Surrogate Street. This is a reduction of approximately 1700m

compared to the without link road scenarios, however the queue would hinder vehicle movements along the entire length of Norwich Road. This is shown in Appendix Z, Figure 1 to 4.

The junction of Exchange Street / Connaught Road / High Street is forecast to experience a queue beyond the length of High Street in 2028 and Connaught Road in 2031. The junction is forecast to experience a peak queue of 156m on High Street and 359m on Connaught Road in the evening peak of 2031. The forecast peak queues for the With Link Road Option 1/2 are of a significant length but they are approximately half the length of the with Town Centre Improvements scenarios. This demonstrates the Link Road does mitigating the impact of the additional traffic as a result of the proposed development, although the town centre will still experience significant queues from some junctions.

### *8.13.8 Town Centre Improvements – with Link Road Option1/2 Summary*

Analysis of the results identifies the Town Centre Improvements with Link Road Option 1/2 relieves pressure from the town centre and delays when the junctions will reach capacity. By providing an alternative route to the town centre for certain movements the Link Road Option 1/2 reduces the RFC values for all future years for both priority and roundabout controlled junctions.

It is under traffic signal control which is shown to best mitigate the impact of the additional traffic demands when the Link Road Option 1/2 is constructed. Apart from the junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road the other junctions the Link Road Option 1/2 delays in which future year they reach capacity and when queue lengths reach critical lengths.

It is forecast that post 2024 all junction layouts would result in queues at each of the town centre junctions which would block through and impact upon other junctions and traffic flow around the town centre. This would result in large delays for vehicles throughout the town centre and require further intervention to improve the town centre highway network.

## 8.14 Town Centre Improvements – With Link Road Option 3

### *8.14.1 Introduction*

The network summary statistics demonstrate the With Link Road Option 3 is forecast to further reduce the impact of the additional traffic demand upon Attleborough's highway network. The junction models have again been ran with the demand flows taken from the S-Paramics model which contains the With Link Road Option 3. This section presents the outputs from the traffic models.

### 8.14.2 *Priority Control - Junction Capacity*

RFC values for the priority junctions are presented in Table 8.39 and Table 8.40 below and graphically in Appendix AA, Figure 1 to 4.

**Table 8.39 - Forecast RFC Am Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'horpe Road | Church Street | Station Road to C'naught Rd | S'gate St to C'naught Rd | C'naught Rd all Movements |
| **2017** | 0.37 | 0.31 | 0.14 | 0.49 | 0.2 | 0.9 | 0.69 |
| **2021** | 0.48 | 0.38 | 0.21 | 0.68 | 0.26 | 0.95 | 1.13 |
| **2024** | 0.57 | 0.4 | 0.27 | 0.9 | 0.31 | 1 | 1.23 |
| **2028** | 0.9 | 0.46 | 0.35 | 1.29 | 0.45 | 1.28 | 5.58 |
| **2031** | 1.41 | 0.52 | 0.54 | 1.63 | 0.77 | 1.4 | 10.9 |

**Table 8.40 – Forecast RFC Pm Peak for Priority Junctions**

| Junction | 1 | | 2 | | 3 | | |
|---|---|---|---|---|---|---|---|
| Future Year | Right turn from C'naught Rd | Straight on to Exchange St | B'thorpe Road | Church Street | Station Road to Connaught Rd | S'gate St to C'naught Rd | C'naught Rd all Movements |
| **2017** | 0.29 | 0.18 | 0.12 | 0.8 | 0.28 | 0.95 | 0.37 |
| **2021** | 0.37 | 0.24 | 0.18 | 1.38 | 0.36 | 1.21 | 0.7 |
| **2024** | 0.44 | 0.26 | 0.21 | 2.4 | 0.41 | 1.36 | 1.35 |
| **2028** | 0.63 | 0.29 | 0.43 | 3.78 | 0.53 | 1.67 | 16.5 |
| **2031** | 1.03 | 0.33 | 0.9 | 4.84 | 0.78 | 1.75 | - |

Table 8.39 and Table 8.40 above demonstrate that the junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street operates over capacity from 2024 onwards. The junction of Exchange Street / Connaught Road / High Street exceeds capacity in 2028. The highest RFC is experienced on Church Street during the 2031 Pm peak. The Town Centre Improvement with Link Road Option 3 is forecast to result in lower RFC values for the Exchange Street / Connaught Road / High Street and Norwich Road / Besthorpe Road / Connaught Road / Church Street.

The junction of Connaught Road / Thieves Lane / Station Road / Connaught Road is forecast to experience lower RFC values on both the Station Road and Connaught Road arms of the junction, but an increase on the Surrogate Street arm. This is as a result of the changes in traffic volumes due to impact of the third link road option.

Table 8.41 overleaf presents the forecast RFC values for the Queens Road / Church Street / Exchange Street junction.

**Table 8.41 – Forecast RFC for both peak periods at the junction of Queens Road / Church Street / Exchange Street**

| Peak Period | AM | PM |
|---|---|---|
| 2017 | 0.22 | 0.3 |
| 2021 | 0.27 | 0.39 |
| 2024 | 0.31 | 0.47 |
| 2028 | 0.39 | 0.62 |
| 2031 | 0.55 | 0.88 |

Table 8.41 above demonstrates the that the Queens Road arm of the Queens Road / Church Street / Exchange Street junction marginally exceeds capacity during the evening peak in 2031 with the town centre changes. Whilst the junction is shown to exceed capacity it is only slightly above the 0.85 threshold and would not suggest cause for concern.

The model outputs illustrate the With Link Road Option 3 results in lower RFC values compared to the With Link Road Option 1/2 and significant reductions compared to the with Town Centre Improvements.

### *8.14.3 Priority Control - Queue Lengths*

Queue length graphs presented in Appendix AA, Figure 1 to 4 indicate the junction of Exchange Street / Connaught Road / High Street does not experience a queue of significant proportion until 2031. Connaught Road is forecast to experience a queue beyond its length in the morning peak of 2031, the queue upon High Street will not exceed 7m in either peak period. The Connaught Road and Surrogate Street arms of the Surrogate street / Thieves Lane / Surrogate Street / Connaught Road are forecast to experience queues in excess of their length from 2024. Such queues would hinder traffic movements throughout the town centre highway network and result in slow moving traffic into and out of the town centre. Vehicles are forecast to queue beyond Thieves lane and onto Besthorpe Road in 2031, this is delayed by 3 years compared to the Town Centre Improvements with Link Road Option ½.

Operating as a priority junction the Church Street arm of the Norwich Road / Besthorpe Road / Surrogate Street / Church Street is forecast to experience a queue beyond its length from 2024 during the evening peak and in both peak periods from 2028 onwards. This would result in queuing traffic blocking back past the town centre shopping area and potentially resulting in further queues on both Queens Road and Exchange Street.

The queue on Queens Road is forecast to peak at approximately 15 vehicles covering approximately 90m in length during the evening peak. The morning peak is forecast to experience a queue no greater than 12m in length. The 2031 evening peak queue will reach back to the entrance with Lidl but will not block any other junction.

Queue lengths at all junctions are forecast to be lower with the Link Road Option 3 as compared to the With Road Option ½.

### *8.14.4 Roundabout Junctions – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.42 and Table 8.43 overleaf and graphically in Appendix BB, Figure 1 to 4.

**Table 8.42 - Forecast RFC AM Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | High St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| 2017 | 0.66 | 0.61 | 0.5 | 0.59 | 0.61 | 0.57 | 0.93 | 0.51 |
| 2021 | 0.81 | 0.76 | 0.7 | 0.75 | 0.77 | 0.73 | 1.14 | 0.65 |
| 2024 | 0.85 | 0.85 | 0.87 | 0.85 | 0.92 | 0.87 | 1.3 | 0.7 |
| 2028 | 0.99 | 1.11 | 1.19 | 1.02 | 1.12 | 1.13 | 1.61 | 0.8 |
| 2031 | 1.1 | 1.48 | 1.48 | 1.03 | 1.19 | 1.32 | 1.84 | 0.79 |

**Table 8.43 - Forecast RFC PM Peak for Roundabout Junctions**

| Junction | 1 | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|
| Future Year | Hig h St | C'naught Rd | Church Street | S'gate Street Right Turn | Norwich Road | Station Rd | S'gate St | C'naught Rd |
| 2017 | 0.47 | 0.86 | 0.6 | 0.67 | 0.68 | 0.87 | 0.84 | 0.45 |
| 2021 | 0.59 | 1.05 | 0.86 | 0.82 | 0.89 | 1.13 | 1.06 | 0.55 |
| 2024 | 0.63 | 1.15 | 1.11 | 0.93 | 1.06 | 1.25 | 1.25 | 0.62 |
| 2028 | 0.73 | 1.35 | 1.49 | 1.13 | 1.31 | 1.47 | 1.59 | 0.72 |
| 2031 | 0.83 | 1.62 | 1.99 | 1.13 | 1.33 | 1.6 | 1.74 | 0.75 |

The model results presented in Table 8.42 and Table 8.43 above indicate a roundabout layout would exceed capacity during the 2021 evening peak period. The highest RFC is forecast for the Church Street arm of the Norwich Road / Besthorpe Road / Connaught Road / Church Street junction. Besthorpe Road and Connaught Road do not exceed capacity in all future years.

All forecast RFC values for the roundabout junctions are lower with the Link Road Option 3 Scenario compared to the With Link Road Option ½. If roundabout layouts where adopted in future years additional mitigation measures would be required to prevent severe delays within the town centre.

### *8.14.5 Roundabout Junctions - Queue Lengths*

Queue length graphs presented in Appendix BB, Figure 1 to 4 illustrate that Connaught Road westbound, Station Road, Surrogate Street (both directions) Church Street and Norwich Road are forecast to experience a queue longer than their length from 2024 onwards. Apart from Besthorpe Road and Connaught Road the queues on the other arms of the junctions are forecast to be of significant length reaching into thousands metres plus.

Whilst the Town Centre Improvements with Link Road Option 3 scenario does result in lower queues than the Link Road Option 1/2, the queues from 2024 onwards are still significantly high and would result in severe delays across the town centre highway network.

The roundabout layouts would still result in severe delays to traffic and hinder traffic movements into and out of the town centre.

### 8.14.6 *Traffic Signal Control – Junction Capacity*

RFC values for the priority junctions are presented in Table 8.44 to Table 8.47 below and overleaf and graphically in Appendix CC, Figure 1 to 4.

**Table 8.44 - Forecast Degree of Saturation for Am Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 53.6% | 56.4% | 14.6% | 57.2% | 33.1% |
| 2021 | 68.7% | 70.2% | 18.5% | 67.9% | 42.1% |
| 2024 | 78.8% | 81.1% | 19.2% | 79.5% | 50% |
| 2028 | 94% | 98.4% | 25.8% | 95.8% | 53.4% |
| 2031 | 98.8% | 110% | 23.7% | 111.7% | 65.5% |

**Table 8.45 - Forecast Degree of Saturation for Am Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 44.5% | 71.6% | 71.7% | 22.5% |
| 2021 | 55.3% | 87.1% | 87.3% | 26.3% |
| 2024 | 63.2% | 98.2% | 96.8% | 27.6% |
| 2028 | 81.9% | 117.2% | 115.3% | 36.8% |
| 2031 | 95.7% | 132.5% | 132.2% | 44.4% |

**Table 8.46 - Forecast Degree of Saturation for Pm Peak for the Junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street**

| Junction | 2 | | | | |
|---|---|---|---|---|---|
| Future Year | Surrogate Street Northbound | Norwich Road Southbound | Church Street left turn | Church Street Ahead and Right | Besthorpe Road |
| 2017 | 64.1% | 62.9% | 13.9% | 62.9% | 25.3% |
| 2021 | 77.9% | 78.9% | 19.7% | 78.2% | 30.2% |
| 2024 | 96.3% | 105% | 25.7% | 101.5% | 29.1% |
| 2028 | 104.5% | 114.3% | 36.6% | 114.9% | 40.9% |
| 2031 | 116.5% | 130.8% | 37.9% | 129% | 60.3% |

**Table 8.47 - Forecast Degree of Saturation for Pm Peak for the Junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road**

| Junction | 3 | | | |
|---|---|---|---|---|
| Future Year | Station Road | Surrogate Street | Connaught Road | Thieves Lane |
| 2017 | 51.5% | 69.5% | 67.3% | 14.3% |
| 2021 | 60.6% | 84.8% | 84.7% | 19.4% |
| 2024 | 69.3% | 97% | 96.1% | 22.6% |
| 2028 | 85.4% | 120.4% | 116.7% | 33.7% |
| 2031 | 92.2% | 131.9% | 128.7% | 36.5% |

Table 8.44 to Table 8.47 identifies the Norwich Road / Besthorpe Road / Surrogate Street / Church Street junction exceeds capacity in the 2024 evening peak. It is not until the 2028 morning peak that the junction is forecast to exceed capacity.

The highest DoS is experienced by all movements on Surrogate Street at its junction with Surrogate Street / Thieves Lane / Connaught Road. The Church Street left turn, Thieves Lane and Besthorpe Road arms of either junction are forecast to operate with spare capacity within all future years.

Whilst the results show the junctions reach capacity in 2024 the DoS values do not exceed 100% until 2028. Post 2028 values above 100% would indicate increased cause for concern and further works would be required to mitigate the impacts of the additional traffic.

The forecast DoS for the signalised junction of Exchange Street / Connaught Road / High Street is presented below in Table 8.48.

**Table 8.48 - Forecast Degree of Saturation for Peak Periods for Signalised Junction of Exchange Street / Connaught Road / High Street**

| Junction | Am | | Pm | |
|---|---|---|---|---|
| Future Year | High St | Connaught Rd Ahead Right | High St | Connaught Rd Ahead Right |
| 2017 | 69.7% | 71.1% | 71.9% | 73.2% |
| 2021 | 85.5% | 85.9% | 89% | 89.4% |
| 2024 | 91.6% | 91% | 98% | 95.8% |
| 2028 | 109.3% | 109.2% | 111.9% | 112.4% |
| 2031 | 130.7% | 135.3% | 127.9% | 132.4% |

Table 8.48 above identifies the signalised junction of Exchange Street / Connaught Road / High Street operates over capacity from the future year 2024 onwards in both the morning and evening peak but does not reach a DoS figure above 100% until 2028. The highest DoS is experienced by vehicle movements from Connaught Road.

### *8.14.7 Traffic Signal Control - Queue Lengths*

Operating under signal control the junction of Norwich Road / Besthorpe Road / Surrogate Street / Church Street is forecast to experience a queue of 800m in length on Norwich Road in 2031. This is a marked decrease from the With Link Road Option 1/2 but would still result in vehicles queuing up to the junction of Norwich Road / Richmond Park.

Surrogate Street will experience a queue beyond its length in 2028, which will result in increased delays at the junction of Surrogate Street / Thieves Lane / Station Road / Connaught Road. The Surrogate Street southbound arm of the town centre south eastern junction will experience queues greater than the length of the link between 2021 and 2024. This would result in increased delays at the Surrogate Street / Thieves Lane / Station Road / Connaught Road junction and see Surrogate Street queued in both a north and southbound direction.

Connaught Road is forecast to experiences a queue which extends into High Street in 2031. This would hinder vehicle movements into Exchange Street. The largest queue at the junction is forecast to reach approximately 1,461m along Surrogate Street into Norwich Road. This is a reduction of approximately 500m compared to the With Link Road Option 1/2 scenarios, but still remains a significant queue. This is shown in Appendix CC, Figure 1 to 4.

The junction of Exchange Street / Connaught Road / High Street is forecast to experience a queue beyond the length of High Street in 2031. The queue on Connaught Road does not exceed the length of the link in any future year scenario. The junction is forecast to experience a peak queue of 112m on High Street and 192m on Connaught Road in the evening peak of 2031.

### *8.14.8 Town Centre Improvements – with Link Road Option 3 Summary*

The Town Centre Improvements with Link Road Option 3 best mitigates the impact of the additional traffic as a result of the development proposals compared to the Town Centre Improvements and Town Centre Improvements with Link Road Option ½. The different layout of the link road and proposed development attracts more traffic onto the link road and so relives pressure on the town centre junctions and significantly reduces forecast queue lengths within Attleborough.

The traffic signal control options are shown to result in the lowest RFC's queues and delays of the three options for the control of the town centre junctions. Under priority control and especially the roundabout layouts would result in significant queues in earlier years as compared to the traffic signal layouts.

The traffic modelling indicates post 2028 the signalised junctions may not fully mitigate the impact of the additional traffic within the town centre. However, the signalised junctions could be upgraded to a MOVA or SCOOT setup which would offer better control over stand alone signalised junctions. Typically a MOVA setup will result in an additional 15% extra capacity at a single junction and a SCOOT setup will offer improved co-ordination of multiple signal regions providing better management of traffic flows which would further improve the operation of the town centre network.

It is also important to note that traffic flows have been derived as demand flows from an uncongested central growth model as a worst case scenario to establish the best performing junction types.

# 9. Town Centre Transport Strategy

## 9.1 Introduction

As discussed in the previous sections of this report there are a number of policies and transport issues that impact on the operation of the town centre. It is important for the future development of the town centre that the transport network is able to support efficient and sustainable access for all users. For this to be possible, measures need to be taken to mitigate the impact of the proposed developments. This needs to be done in a sustainable way that does not affect the attractiveness of Attleborough as a place to live, work and visit. This can be developed through the development of a comprehensive transport strategy that addresses not only the capacity issues that exist on the existing network but also addresses the need for travel to and through Attleborough town centre.

The starting point for the Attleborough town centre transport strategy is to improve the attractiveness of sustainable transport modes as an alternative to using the private car. The results presented in Section 4 show that the popularity of the car as a method of travel to work has increased between 2001 and 2010 for residents of Attleborough and whilst the growth in rail patronage is encouraging there is still much that can be done. As such a package of measures should be used to encourage this modal shift and this strategy considers the ways that those measures can be improved to make them more attractive choices for the current residents of Attleborough and to accommodate the proposed growth.

It is also acknowledged that the car is an important mode of travel providing motorists freedom and flexibility to travel where and when they want and enabling them to access jobs, services and facilities. As such the strategy also needs to consider how best to balance the future demands for use of private vehicles with the needs of other road users, highway safety and environmental concerns including the potential negative impacts of increased traffic levels on sensitive urban environments such as that within Attleborough town centre which has an historic core and Conservation Area designation.

By considering the existing constraints and likely future issues it is possible to improve the design of future development to encourage modal shift. This section of the report sets out a strategy for Attleborough town centre to achieve these aims whilst also recognising the importance of the private car and the need to deliver a transport network to support the plans for growth.

## 9.2 Walking and Cycling Strategy

### *9.2.1 Introduction*

It is widely recognised that encouraging walking and cycling has many benefits. At the UK level, three quarters of journeys by all modes of travel are less than five miles, with half of all trips less than two miles. It is on such short trips that travellers will derive little or no benefit from driving in relation to walking and cycling. Walking and cycling are the most sustainable forms of transport for short trips, are cheap and available to all. They do not adversely affect the environment through emission of Carbon Dioxide (CO2) or particulates (PM10), nor do they create traffic related noise pollution or sever communities.

The proposed growth of Attleborough provides the opportunity to develop a network of high quality walking and cycling corridors that should link housing areas to the town centre, employment areas, other key facilities and green spaces.

The unique urban and rural setting of Breckland combined with the level topography means the area is well suited to a range of walking and cycling purposes, including travel to school,

commuting, for exercise, recreation or access to the countryside. There is limited cycle infrastructure within Attleborough although the existing residential streets provide a good network of cycle routes for experienced cyclists within the existing built up areas. However, further improvements are possible to encourage increased cycle usage, particularly within the new development areas.

### *9.2.2 Walking*

Walking provides an alternative to travelling by private car for short journeys if an attractive environment for pedestrians is provided. The number of Attleborough residents choosing to walk to work has shown a reasonable increase between the 2001 and 2011 censuses. To further encourage walking in Attleborough, attractive and direct pedestrian links between residential areas, the town centre and employment areas should be provided.

#### ***Proposed Measures – Pedestrian Access to the Town Centre***

As the majority of new development is to be located to the south of the railway line an opportunity exists to provide pedestrian and cycle routes between the urban extensions and the town centre which are shorter and comparable in terms of journey times to vehicular routes. It would be preferable to provide pedestrian/cycle over-bridges which are accessible to all and located to serve key desire lines. The replacement of the existing pedestrian level crossings would be the most obvious solution although consideration would need to be given to the site layout of new development to the south of the railway line and the need to tie into existing networks to the north of the railway line.

#### ***Proposed Measures – Pedestrians within the Town Centre***

The proposals to re-introduce two-way traffic to Surrogate Street and Connaught Road will remove erroneous through traffic from Exchange Street and Church Street. This creates an opportunity to improve the public realm and increase priority for pedestrians and cyclists within the key retail streets of the town centre, either by providing cycle lanes and increased footway widths or through the introduction of a shared surface scheme or similar.

Reintroducing two way traffic on Surrogate Street and Connaught Road would also remove confusion for pedestrians and allow cyclists to use the carriageway in both directions without having to use the footway (introducing potential conflict with pedestrians) to travel contrary to the flow of one-way traffic. The changes would also facilitate the introduction of a HGV ban on Exchange Street and Church Street further improving the environment for all within this area.

There are a number of measures identified within the Smarter Choices report aimed at addressing existing issues within the town centre including the improvement of existing pedestrian routes and crossing facilities. These proposals also include for a new pedestrian link between the Library on Connaught Road and Church Street to provide a traffic free route through the town centre which avoids the need to travel around the one-way system. However, considering the difficulties that might be experienced implementing this piece of infrastructure and the fact that Surrogate Street already provides a similar route if travelling on foot from the station it might not be overly beneficial for the town centre.

### *9.2.3 Cycling*

By providing an attractive cycle network for cyclists of all abilities which links up the key education, retail, employment and leisure facilities with residential areas, cycling can be a realistic alternative to the private car. Providing appropriate facilities at either end of the journey to ensure cycle use is safe, convenient and comfortable would further enhance the chances of increasing cycle use. There are a number of measures identified within the Smarter Choices report aimed at addressing existing issues within the town centre including the improvement of existing cycle routes and facilities.

***Proposed Measures – Cycle Access to the Town Centre***

The existing cycle network could be substantially improved to benefit the town as a whole and encourage more journeys by bicycle. Given the growth aspirations around the town, the improvements to the cycle network will be a vital step in reducing the impact of the developments on the town centre. Following a review of previous documents including the Attleborough Land Use and Transport Strategy and consideration of existing and possible future desire lines the following measures are recommended:

1. Develop a coherent, connected cycle network through Attleborough using lightly trafficked streets, particularly improving links between new development and the town centre across the railway line;
2. Improve pedestrian/cycle access across the railway line at Leys Lane by introducing a suitable over-bridge accessible by all;
3. Given the proposed reduction in traffic from possible changes to the towns gyratory and the construction of the proposed link road. A marked cycle lane could be implemented through the centre of the town along High Street and Church Street.
4. On street cycle lanes on the main routes into Attleborough would improve connectivity for existing and proposed residential area both north and south of the A11 to encourage more cycle journeys from areas such as Great Ellingham and Old Buckenham.

***Proposed Measures – Cycling within the Town Centre***

The provision of infrastructure and facilities for cyclists within the town centre should be improved to ensure that it is safe and convenient for people to cycle into and through the town centre. Providing high quality cycle parking at convenient locations within the town centre is also likely to be key to achieving increased levels of cycle use. Our recommendations for measures within the town centre include:

1. A short route adjacent to the existing town centre post office linking proposed routes which terminate on London Road to the lightly trafficked St Mary's Close;
2. Given the value of modern bikes improved cycle parking is a must for encouraging journeys by bike. The existing town centre cycle parking should be improved with a total of 10 Sheffield style cycle stands and appropriate signage as a minimum requirement. A location close to the public conveniences in the town centre car park would provide changing facilities for cyclists and be a central location at the heart of the town centre.
3. 10 Sheffield style cycle stands should also be provided at the Library on Connaught Road with the appropriate finger post signs indicating their location. These would provide cycle parking for the library but also cycle parking for cyclists travelling to the town centre.
4. Cycle parking at the train station on or close to the station in a well lit visible location would encourage more journeys by cycle as part of a longer journey by improving links with public transport.

### *9.2.4 Summary*

The flat topography and small size of the town ensures that walking and cycling offer a real alternative to private car journeys. The current lack of cycle infrastructure and limited promotion of the mode of transport results in very few journeys by bike locally.

The necessary infrastructure including marked cycle lanes on the main roads into the town would promote confidence in cyclists and encourage more journeys by this mode. Appendix DD presents the proposed measures which would improve provision for walking and cycling within the town centre with more detail on proposals for Attleborough provided in the Smarter Choices report.

## 9.3 Public Transport Strategy

### *9.3.1 Introduction*

As identified in the assessment of baseline conditions public transport provision within Attleborough is currently limited with hourly rail services to Norwich and Cambridge and half hourly bus services to Norwich. The following proposals suggest measures to improve and promote the use of public transport for access to and travel from Attleborough town centre.

### *9.3.2 Bus Services and Facilities*

The provision of bus services and facilities within Attleborough should be improved to ensure that bus use provides a convenient and comfortable alternative to the car which is competitive in terms of journey times and affordability.

***Proposed Measures – Bus Access to and within the Town Centre***

Our recommendations for measures to improve bus services and facilities within Attleborough town centre include:

1. Existing bus stops should be audited to ensure provision is adequate and in accordance with appropriate standards. As a minimum the existing bus stops should all benefit from timetable information that is up to date and clearly displayed as to ensure passengers are informed. The provision of new or improved bus shelters should be considered at all bus stops within the town centre. However, considering the residential location of some bus stops and current levels of usage this may be unsuitable. The bus stops located adjacent to the High School on Norwich Road would benefit from shelters and may increase patronage from school children.
2. The provision of new or extended bus services to penetrate the urban extension so that the majority of the built up area continues to be within 400m of a bus stop. Where possible bus stops should be located a maximum of 200m apart. The forecast increase in residential dwellings south of the railway would require an additional or extended bus service to ensure the dwellings are linked to existing bus services, areas of employment and the town centre. A shuttle bus service could operate between the new dwellings, and Snetterton Heath linking the station and other bus services within the area via the town centre. Possible routes for new or extended services are considered within the Smarter Choices report.
3. Where new bus stops are identified as being required to facilitate new or extended services to penetrate the urban extension then new bus stop facilities should be provided to a standard based on predicted levels of usage. Details of proposed bus stop standards are provided in the Smarter Choices report.
4. A new bus/rail interchange facility would greatly increase public transport integration in Attleborough as the distance between the rail station and the nearest operational bus stop is currently some 650m. There are a number of possible locations for a bus/rail interchange facility including the existing rail station car park. However, the provision of such a facility is likely to be difficult and expensive given requirements for land purchase and geometric requirements to facilitate turning buses, layover bays, etc.

   A cost effective alternative would be to use bus stops located close to the rail station on Station Road. This would provide a similar link between bus and rail and could utilise the existing bus stop locations which are currently out of use. However, service routes would need to consider the lack of turning facilities.

   The introduction of a bus/rail interchange (for services passing the station) are likely to see these stops becoming the timing points for services so that bus and rail services can be co-ordinated. The timings are likely to be determined by the operator but if expected to serve ‘out commuting’ buses could be expected to arrive shortly before trains in the AM and shortly after in the PM.

5. Should a significant number of new bus services be generated by the urban expansion there may be a need to provide a bus interchange facility within Attleborough town centre. The logical location for this would be Queen's Square / Church Street but this is likely to hinge on the one-way on Church Street continuing to work for existing and new services.

   The scale of the facility would depend on the number and timetabling of services. It is likely that the existing bus lay-by would need to be extended or TRO's amended in order to accommodate additional bus stop/waiting facilities. The existing bus shelter does little to attract bus users, is unwelcoming and is poorly located in relation to the existing bus stop. Improvements should be made to introduce greater levels of transparency or the facility should be replaced with a bigger, brighter, more transparent facility with improved passenger information (possibly real time) which meets the needs of all potential users.

   If a new bus/bus interchange is to be provided there may be capacity restrictions on how many buses can be dealt with (depending on the space available, number of stops, etc.) It is recommended that provision for additional bus stop/layover space be identified close to the existing Queen's Square stop to avoid buses overcrowding the highway to the detriment of other traffic. This could be accommodated on Queen's Square or Exchange Street although the exact location would need to be carefully considered so as to minimise impact on other road users. The impact of any proposed bus interchange and the physical changes required to support its operation would also need to be carefully designed so as to respect the more intimate and eclectic character of the conservation area.

### *9.3.3 Rail*

Rail services are largely governed by franchise commitments to service levels and as such direct influence on rail service provision is likely to be minimal. However there are opportunities to improve access to and facilities at the rail station.

***Proposed Measures – Rail Access to and within the Town Centre***

Our recommendations for measures which improve access to and facilities at Attleborough rail station include:

1. Improved passenger facilities to include an enclosed sheltered waiting room and ticketing machines. This could be done through bringing the existing station building back into use and would provide much improved facilities as compared to the existing platform shelters. It is also recommended that facilities such as real time passenger information, toilets and CCTV cameras be provided to further improve conditions for rail passengers using Attleborough station. In addition to the above there are also improvements which can be made to platform accessibility as detailed in the Smarter Choices Report.

   The station building is not currently in use, ideally it would be brought back into use to incorporate a covered passenger waiting room and this should be investigated as development proposals are developed. There would be sufficient space to accommodate a commercial use such as small retail store or café, but the use would have to be complementary to the station and not generate significant parking demands. However a use such as a café would provide additional staff presence at the station and provide surveillance of any waiting area.

   The station buildings and area of parking adjacent are owned by Network Rail. The scale of the refurbishment of the buildings required is not currently known – no internal inspection has been carried out so it is not clear what the layout and condition of the building is. The cost could be £50-£100k for basic work (assuming no significant structural alterations). The implementation of a waiting room combined with a retail facility is likely to be more financially sustainable than a waiting room on its own right and the retail facility owner.

2. Improve provision of sheltered, secure cycle storage at the station to ensure that cyclists who use the rail station can leave their cycle at the station with confidence that it will not be stolen or affected by adverse weather conditions. The provision of CCTV cameras would help to re-enforce a sense of security. There is currently cycle storage in the vicinity of both platforms. The Cambridge Platform has Sheffield stands with a shelter on the platform which provides a good level of visible cycle parking. The Norwich platform has cycle parking but it is not readily evident and does not have good natural surveillance.

   Cycle parking on the Norwich Platform could benefit from being in a more open area with a shelter. The platform might not be deemed wide enough to accommodate similar provision to the opposite platform however. To improve provision, as a minimum a canopy should be added to the existing stands and signage should be provided to alert passengers to their location. Ideally if the car park and entrance area are being reconfigured a more visible location should be sought for the cycle stands. The cycle lockers on the Norwich Platform should remain, but usage monitored in order to ensure they are often available for all users.

   On the Cambridge bound platform, a further six Sheffield stands should be provided under shelter in an appropriate location on the platform. Such expanded provision could be in the medium turn to reflect any increased use of rail;

3. Improve and increase the car parking provision at the station to accommodate future demand for parking where rail forms part of a longer door-to-door journey. There is currently parking adjacent to the station building (Norwich platform) which is well used, albeit in a haphazard manner, with no markings or signing. This does not appear to provide sufficient capacity to accommodate existing demand. Modal shift towards more sustainable transport may reduce the proportion of those arriving by car but as demand will increase with the new development the absolute number of parking spaces required is likely to increase. A lack of parking at the rail station is also likely to suppress rail demand and as such some additional parking will be required. Potential solutions for car parking are discussed within the Smarter Choices Report.

4. Breckland Council should work with Norfolk County Council to understand the implications and opportunities that may arise as a result of the devolution of responsibility for managing rail franchises and explore what powers might be available to influence service levels and rolling stock provision for services calling at Attleborough.

   Attleborough is currently served by an hourly Greater Anglia train service between Cambridge and Norwich, i.e. one train an hour in each direction. In addition there are two East Midlands Trains services from Ely to Norwich which stop in AM peak and two from Norwich to Ely which stop in the PM peak. Initial high level calculations (using simplified Passenger Demand Forecasting Handbook methodology) suggest that if the Norwich to Cambridge frequency were increased from hourly to half hourly that the demand for this service could increase by up to 29%. Based on 2011-12 passenger figures this would equate to 46,500 one-way trips. Stopping all East Midlands train services at Attleborough would provide two trains an hour, however these would not be evenly spaced and would therefore not necessarily achieve the same level of demand uplift as a half hourly service.

   There would also be an increase in journey time for existing passengers as a result of an additional stop; this is typically around two minutes. Rail demand forecasting methodology suggests that for a 40 minute journey this would result in a loss of approximately 7% of passengers. Additional residential accommodation and associated population increase will also generate additional passengers at Attleborough.
   Using census data and the NRTS data to estimate trip rates for the current service level the additional rail patronage associated with the 4000 new homes could be expected to generate somewhere in the region of 56,000 (+35% of current demand) one-way trips.

These demand forecasts are high level and based on significant assumptions: further work will be required to refine these as the location, composition and timescales of the development and potential transport improvement packages are refined.

5. Improve integration with bus services (see bus proposed bus measures above)

## 9.4 Parking Strategy

### *9.4.1 Introduction*

The assessment of baseline conditions has identified that parking provision is characterised by one large and several small public car parks supported by a number of private car parks and a limited number of on-street parking spaces. The Council owned public car parks in Breckland are currently free of charge as are the private car parks although the Sainsbury's and Lidl car parks are subject to 2 hour limits enforced by ANPR.

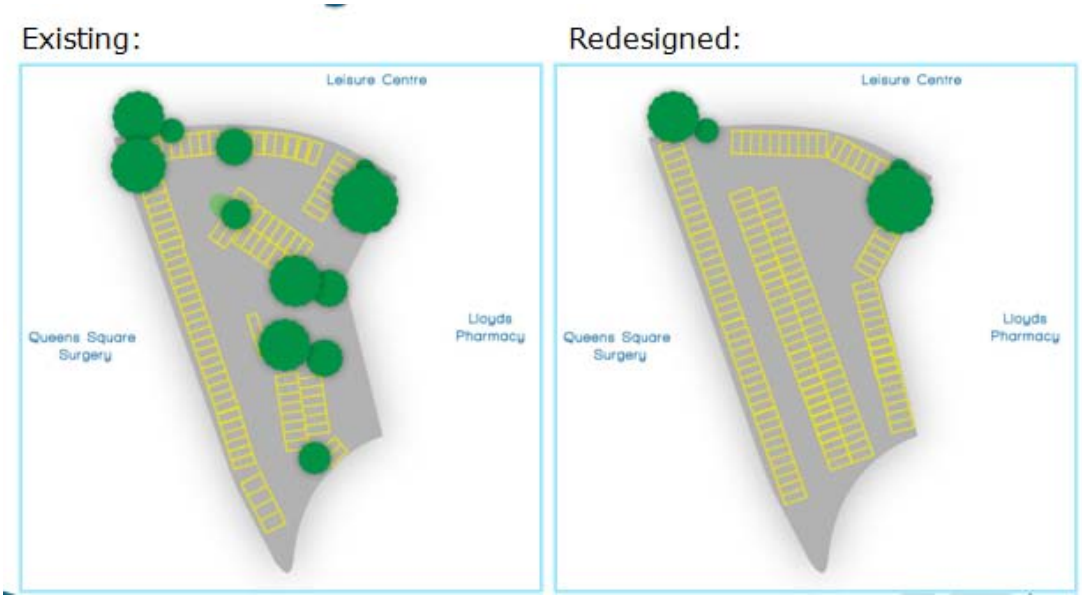
**Proposed Measures – Parking within the Town Centre**

Our recommendations seek to improve the way town centre parking is used and priced in order to balance the need to support both sustainable travel and future growth. The intention is that the availability of short stay parking for shoppers and visitors be enhanced by encouraging commuters, many of whom drive alone, to use more sustainable modes of transport. The proposals are as follows:

1. Retain the current level of town centre off street parking within the town centre as far as possible, whilst accommodating proposed changes to the one-way system and seek to review the layout of existing off street car parks to determine if more efficient layouts could yield greater parking provision. The UEA study suggests that 20% more parking could be achieved by reconfiguring the Queen's Square Car Park as illustrated in Figure 9.1 overleaf. The proposal would however require the felling of trees which may well be protected by Tree Preservation Orders (TPOs) or may otherwise be protected by the Conservation Area designation within the town centre and would also need to include a number of DDA compliant spaces.

2. Continue to monitor and review car park usage and employ balanced and proportionate parking controls and charges as appropriate. This may necessitate the introduction of enforced parking restrictions or charging regimes to reduce all-day commuter parking from town centre car parks; any knock on effects such as overspill parking onto residential streets would also need to be monitored and measures taken as appropriate, e.g. controlled parking zones. Both of these measures would require proportionate enforcement to ensure they continue to be effective.

**Figure 9.1 - UEA Proposal for Revised Parking Layout at Queen's Square Car Park**




3. Variable message signs could be considered to inform drivers approaching Attleborough town centre of car parking availability across the limited number of car parks. It is however considered that due to the compact nature of the town centre and the dominance of the Queen's Square Car Park that this would offer limited benefits
4. Seek to deliver improvements to public transport provision and walking and cycling infrastructure to help reduce the demand for parking particularly from those travelling short distances. This could also be supported by other measures identified in the Smarter Choices report such as the use of Travel Plans, and marketing and promotion of Smarter Choices measures
5. Improve car parking provision at Attleborough Rail Station to promote use as a park and ride site for longer distance commuting and other journeys
6. Review on-street parking provision to ensure that the planned improvements to the town centre network can be delivered and to determine if existing limited waiting restrictions are appropriate and effectively enforced
7. Should parking stress escalate to unacceptable levels and demand management measures prove ineffectual options to further increase parking provision may need to be considered.
    i. These are likely to include providing new car parks in strategic locations on the periphery of the town and should seek to maximise footfall along frontages in order to benefit businesses in the town centre and minimise the number of vehicles entering the town centre. These proposals may also provide an opportunity to reduce parking provision within the town centre so that space can be utilised to improve the public realm or for future development;
    ii. Seek to extend existing car parks by utilising adjacent land where available or by building a multi-storey car park. Opportunities to extend car parks are likely to be limited and would generally be considered to be inefficient use of land within a town centre area.

Any proposals for parking will be consistent with CPE requirements and NCCs parking principles ensuring appropriate provision of parking for the disabled and parent and child spaces. Options for funding of these measures are considered within the Implementation Plan.

## 9.5 Local Highways Strategy

### *9.5.1 Introduction*

The traffic impact assessment undertaken to assess the impact of future development on the local highway network has identified that a number of measures are required in order to support these proposals and prevent significant congestion from arising within Attleborough town centre.

### *9.5.2 Review of the Current Town Centre One-way System*

As part of the recommendations from the traffic impact assessment the conversion of Connaught Road and Surrogate Street from one way to roads available for two way traffic is proposed. The introduction of a HGV ban within the town centre is also proposed. The necessary measures required to introduce two-way traffic and minimise HGV's using the town centre are described below.

#### ***Proposed Measures – Changes to One-way System***

The Do-Minimum network and junction modelling indicate significant deterioration of network operation as a result of the additional traffic being generated by the proposed development. As such it is considered that measures could be introduced within the town centre to improve network and junction operation. As such it is recommended that by 2017 the Attleborough town centre one-way system be amended as follows:

1. Introduce two-way traffic on Connaught Road and Surrogate Street;
2. Junction improvements at Church Street / Surrogate Street junction to accommodate two-way traffic;
3. Junction improvements at Surrogate Street / Connaught Road junction to accommodate two-way traffic;
4. Junction improvements at High Street / Connaught Road / Exchange Street junction to accommodate two-way traffic;
5. Introduce a HGV ban on Church Street and Exchange Street (possible future extension to include Surrogate Street and Connaught Road dependent on Link Road).

Connaught Road and Surrogate Street form part of a busy circuit of the local distributor road, B1077 Attleborough town centre. The traffic flows are relatively high along these two roads and include a fair proportion of HGV's and buses. Further recommendations in relation to each of the roads and at the junctions along them are provided in the following paragraphs.

#### ***Carriageway Width Considerations***

Manual for Streets 2, gives a minimum carriageway width of 5.5 metres for this type of traffic to fit side by side, but the Manual recognises that these widths should not be used as design widths (it could be argued that these widths are barely enough for wing-mirrors to be avoided).

In engineering terms, the most appropriate highway width for this type of street is 7.3 metres (DMRB TD/27/05). In many circumstances in the UK this cannot be achieved and lesser widths are accepted for two-way traffic. In order to maintain safe carriageway widths however, the Safety at Street Works and Road Works ACOP can be another source of clarity. For two-way, normal traffic including buses and HGV's; 6.75 metres is quoted as a recommended minimum width. Coming down further from this as absolute minimum lane widths should be 3.25 metres (desirable minimum) and 3.0 metres (absolute minimum).

With this in mind, the overall carriageway width along Connaught Road and Surrogate Street should not be less at any point than 6 metres. Manual for Streets 2 suggests that an absolute minimum width of footway should be 1.5 metres. These widths will be the minimums considered

when analysing the affect of placing two-way traffic on the two roads in question. With these limitations in mind our recommendations for alterations to the one way system include:

### *Proposed Measures - Connaught Road*

Connaught Road itself is of sufficient width to accommodate two-way traffic for most of its length, particularly the eastern part of the road near to its junctions with Surrogate Street and Thieves Lane. For the majority of Connaught Road, the carriageway width ranges from 6.3 to 7.1 metres. Additionally there are also adequate footways on either side. However, towards the western part of Connaught Road, in the vicinity of its junctions with Exchange Street and Edenside Drive; the total available highway width (carriageway plus footways) is sub-standard at 7.8 metres. It should also be noted that not all of the footway in this area is classified as highway as indicated in Appendix EE.

As discussed, the total carriageway width must be at least 6 metres to accommodate two-way traffic flows with 1.5m footways on either side. Ideally, land take would be an option but it doesn't appear possible at this location. With this being the case, the footways must either be taken down to sub-standard widths or a priority give way system created to ensure traffic doesn't directly pass each other at this point. However, given the likely traffic flows on the route a priority give-way system is likely to introduce significant delay particularly on the give way approach.

Reducing footway widths is likely to impact on statutory undertakers' equipment but should be achievable particularly where these negative impacts can be offset by improvements to pedestrian crossing facilities in the locality. Whilst neither option provides an ideal solution it is apparent that two-way traffic can ultimately be accommodated on Connaught Road with a limited amount of work.

Further to the carriageway widening or priority give-way arrangement discussed above, there are a number of minor changes recommended along Connaught Road to ensure it is safe for two-way traffic:

1. Existing Traffic Signs / Proposed Traffic Signs – there are a number of existing electrically connected traffic signs and posts to be removed. The majority of these relate to the existing one-way traffic flow;
2. In order to convey the new message of two-way road, the introduction of advanced direction traffic signs would be of benefit. This would also help to highlight the new routes for HGV's (discussed in more detail further on in this statement);
3. Existing Road Markings / Proposed Road Markings – works will be required to amend the road markings along the length of the road. These will be low-cost measures. The only consideration along Connaught Road for road markings is the presence of faded parking bays for about 70 metres towards the eastern part of the road (on the north side). It would be beneficial if parking was to be prohibited along the full length of Connaught Road to ensure the expeditious movement of traffic along it in both directions;
4. Double yellow lines and kerb blips should be introduced for the full length of the road to ensure that no waiting and loading of vehicles occurs once two-way. This is particularly important due to the width constraints.

### *Proposed Measures - Surrogate Street*

The existing highway along Surrogate Street is made up of a western sided footway ranging from 1.3 to 1.8 metres from a north to south direction; a carriageway ranging from single lane in the north to south direction, flaring to two narrow lines in the same direction. The width of the existing carriageway ranges from 3.9 to 5.8 metres; on the eastern side of Surrogate Street

there is an un-segregated shared-use cycle track and a grass verge. The width of the cycle track and grass verge combined range from approximately 5.8 metres to 4.3 metres.

The minimum highway width along Surrogate Street appears to be approximately 11 metres. As such, it is recommended that the following provisions be made in order to safely accommodate two-way traffic flow (including HGV's and buses):

1. The western sided existing footway is 1.3 metres to 1.8 metres and can remain in place. The carriageway width should be widened to at least 6 metres along its length. For this to happen, the eastern un-segregated shared-use cycle track and grass verge widths must be reduced. If a 3 metre wide shared-use path is created and the grass verge reduced to 0.7 metres at its minimum, the street could achieve two-way traffic whilst maintaining adequate carriageway, footway and cycle track widths. Again, this may require the relocation of statutory undertakers' equipment.

2. Removal of electrically connected one-way traffic signs; introducing advanced direction traffic signs (assist with HGV movement, discussed further on); remove existing road markings and replace and ensure double yellow lines remain along both side of the road.

Fortunately, the majority of the existing street furniture including street lighting columns have been placed along the back of the highway, i.e. in the existing grass verge on the east side – the affected side where works will take place. This means that there will be minimal relocation of these assets representing a significant cost saving.

### *9.5.3 Connaught Road – Junction with High Street / Exchange Street*

Currently the only movements allowed within the junction are from High Street to Exchange Street; from Connaught Road to High Street and; from Connaught Road to Exchange Street as illustrated in Figure 9.2 below which illustrates the existing junction layout. In order to facilitate all movements resulting from the change to two-way there are a number of options which have been considered.

**Figure 9.2 - Connaught Road / Exchange Street / High Street Junction – Existing Layout**

Non- motorised modes also need considering i.e. pedestrians and cyclists when looking at options for designing the new junction, as such each option will be appraised with all road users in mind.

### *Priority Junction*

Retaining a priority junction in this location would allow traffic flow between Connaught Road and High Street to be given priority with movements from High Street to Exchange Street and Connaught Road to Exchange Street needing to give way. It is envisaged that through traffic would largely stay on High Street and Connaught Road. Uncontrolled pedestrian crossing points would be included in any design to assist pedestrian movements through the junction.

The junction modelling undertaken indicates that this junction type would work well in the Do-Something Town Centre scenarios until 2021 but is also shown to operate well until 2031 with the addition of either link road option. An indicative road layout for this option is provided as Drawing CS/059912/01/002B in Appendix FF, Figure 1.

### *Mini-Roundabout*

As a three arm junction a mini-roundabout option would be suitable in this location. However, this junction type would require the removal of the existing traffic island. The advantage of this facility would be that all movements would be catered for with similar levels of priority. A 4-metre diameter mini roundabout leaves good widths for all traffic in all directions limiting the delay for all movements. Uncontrolled crossing points on each arm could again be used to assist pedestrians.

Besides the costs associated with the removal of existing street furniture such as street lighting columns, and electrically lit traffic signs (particularly on the existing traffic island, these include No-Entry signs) the costs for implementing a mini-roundabout are unlikely to be significant. The junction modelling undertaken indicates that this junction type would operate over capacity in all the future year Do-Something Town Centre scenarios. With either of the link road options junction performance is improved, but the junction still operates over capacity in all future years. An indicative road layout for this option is provided as Drawing CS059912-01-003B in Appendix FF, Figure 2.

### *Traffic Signal Control*

The other feasible option at this location is the introduction of a traffic signal controlled junction. This junction type would allow the inclusion of controlled pedestrian crossing facilities and could include bus priority, giving hurry calls to approaching late running buses. Should traffic signal control also be considered suitable at other town centre junctions then the linking of junctions through the introduction of intelligent traffic control system such as SCOOT could potentially deliver greater benefits.

The junction modelling undertaken indicates that this junction type would operate over capacity in all future year Do-Something Town Centre scenarios, but does record the lowest queues of all three junction options. With the addition of either link road option the junction is shown to operate with spare capacity until 2028. An indicative road layout for this option is provided as Drawing CS059912-01-004B in Appendix FF, Figure 3.

### *Proposed Measures – Connaught Road / Exchange Street Junction*

It is recommended that a suitable junction type be delivered which will adequately accommodate likely future traffic demands whilst safely and efficiently accommodating other road users. Each of the options considered has its own merits. However it is considered that in terms of the overall flexibility offered along with the levels of priority afforded to public transport, pedestrians and cyclists that a signalised junction would offer the greatest benefit in this location.

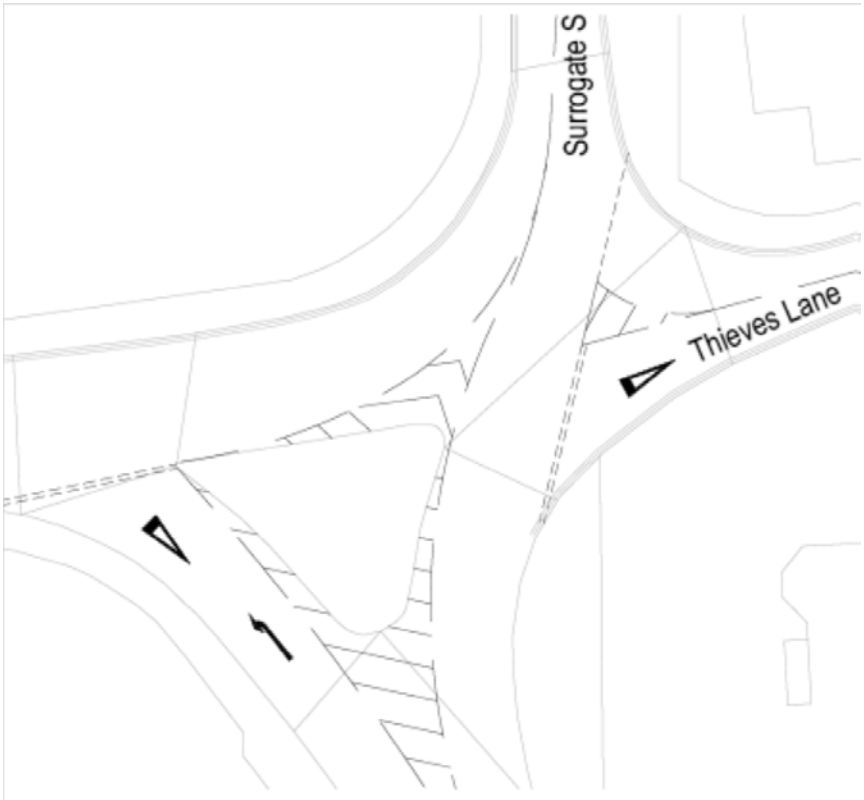
It should also be noted that there is a committed scheme to introduce traffic signal control at this junction as part of the works required to accommodate the approved residential development on London Road. This is likely to reduce costs significantly as much of the infrastructure and equipment required will already be in place.

### *9.5.4 Connaught Road – Junction with Station Road / Thieves Lane*

The existing junction does not allow vehicular movements from Station Road to Surrogate Street and any future movements are likely to be impacted by the substantial triangular traffic island on which the Crimean War Memorial is situated. It may prove difficult to relocate this memorial which is a listed monument. A number of options have been considered for amending this junction to accommodate two-way traffic flows and HGV's movements.

Non- motorised modes also need considering i.e. pedestrians and cyclists when looking at options for designing the new junction and as such each option will be appraised with all road users in mind. Figure 9.3 below shows a sketch of the existing junction layout.

**Figure 9.3 - Surrogate Street / Thieves Lane / Connaught Road Junction – Existing Layout**




#### *Priority Junction*

A number of changes would be required at this junction to facilitate two-way traffic between Surrogate Street and Station Road. A simple priority junction arrangement may allow simple changes to road markings and traffic islands to be made which would facilitate a safe and efficient layout. Such an option is also likely to enable the existing large triangular traffic island (including the monument) to remain largely in place.

The carriageway width to the east of the existing island, Station Road to Connaught Road, is approximately 7.75 metres. This means that with a minimum of a 2.5 metre right turn lane (as per Traffic Signs Manual Ch.5) an available remaining width of 5.25 metres would be inadequate. With a departure from standard, the right turn lane could be reduced to 2.25 metres

wide to achieve 2.75 metre wide running lanes however, the situation remains very tight although this could be considered acceptable in a constrained urban environment.

The swept path analysis performed on this layout indicates that the manoeuvre would be difficult for articulated goods vehicles. This has been carried out using an articulated vehicle of 16.5 tonnes (the maximum size of vehicle to analyse) and shows that the vehicle can make the sweep however it is tight.

The pedestrian facilities for this layout are not ideal either. With two way traffic between Surrogate Street and Station Road having priority the opportunities for pedestrians to cross the road are likely to be difficult. An alternative priority layout with priority movements between Surrogate Street and Connaught Road could also be considered and would act to slow the majority of movements at the junction with the possible exception of the southbound movements from Surrogate Street to Station Road. This is likely to improve conditions for pedestrians but is likely to result in a confusing junction layout given adjacent give ways from Thieves Lane and Station Road.

The junction modelling undertaken indicates that this junction type would operate over capacity in all the Do-Something Town Centre future year scenarios, experiencing significant queues on both Station Road and Connaught Road. Either link road option is shown to improve the operation of the junction, but it still operates over capacity in all future year scenarios. An indicative road layout for this option is provided as Drawing CS059912-01-002D in Appendix GG, Figure 1.

### *Roundabout*

In order to introduce a roundabout at this junction, the appropriate type of roundabout i.e. fixed or mini, need to be determined. Using the Inscribed Circle Diameter (ICD) of the junction, this being the largest circle that can be drawn between the kerbs of the junction, it can normally be decided whether a fixed or a mini roundabout is suitable. The ICD of this junction is 24m.

Usually anything less than 28m would mean that a mini-roundabout should be used (DMRB TD54/07). However, in this situation it may be wise to take a departure from standard to use a fixed roundabout as all across movements have been traced by the largest articulated vehicle and have shown no issues although U-turns would not be accommodated.

On a fixed roundabout, the movements are separated and regulated very well. This also retains the benefit of retaining the monument in its current location. Other than introducing a fixed roundabout, as discussed, a mini-roundabout could be introduced. Whilst not providing the same level of separation and regulation, mini-roundabouts have proven successful in many situations at maintaining traffic flow and making busy junctions safer. At either type of roundabout, uncontrolled crossing points could be added on to each junction arm to assist pedestrians.

The junction modelling undertaken indicates that this junction type does not work well as a roundabout in the Do-Something Town Centre scenarios. The junction is shown to operate over capacity in the future year scenarios and experiences significant queues in the later future years. The with link road options do show an improvement in the operation of the junction, but still operates over capacity and experiences significant queues. An indicative road layout for this option is provided as Drawing CS059912-01-003D in Appendix GG, Figure 2.

### *Traffic Signal Control*

By introducing a traffic signal junction at this location, the existing triangular traffic island (with monument) will need to be removed. Footways and kerb lines would need to be altered and expensive traffic signals equipment introduced. This option does however satisfy all road users

safely and efficiently. Swept path analysis of the junction shows that there are no turning circle issues relating to large vehicles for any movement.

Pedestrians would benefit from their own phase within the signals operation, making it safer when crossing each arm of the junction. Cyclists can also be catered for either as part of the same phase as pedestrians, in a separate phase of their own to facilitate crossing from Surrogate Street to Station Road, or their movements could run alongside the general traffic movements and could be assisted through the use of advanced stop lines.

The junction modelling undertaken indicates that this junction type would work well in the Do-Something Town Centre scenarios until 2021 but is also shown to operate well until 2028 with the addition of either link road option. Under signal control the junction is forecast to experience the lowest queue lengths of each of the three options for the junction. An indicative road layout for this option is provided as Drawing CS059912-01-004D Appendix GG, Figure 3.

***Proposed Measures – Connaught Road / Station Road / Surrogate Street***

It is recommended that a suitable junction type be delivered which will adequately accommodate likely future traffic demands whilst safely and efficiently accommodating other road users. Each of the options considered has its own merits. However it is considered that in terms of the overall flexibility offered along with the levels of priority afforded to public transport, pedestrians and cyclists that a signalised junction would offer the greatest benefit in this location.

A signalised junction is likely to be the safest option for all road users, will conform to all design standards and will allow all users of the junction to have sufficient time to exit the junction. The use of signal control at this junction would also enable the intelligent linking with other signalised crossings and junctions within Attleborough.

The significant factor in adopting this recommendation would be the need to relocate the Crimean War Memorial to a suitable location. There may be land available to the front of *The Mulberry Tree* restaurant a short distance from its current location. The other favourable option may be to depart slightly from standard and introduce a small fixed roundabout with the advantage of keeping the traffic moving and retaining the listed monument in its current location.

### *9.5.5 Surrogate Street – Junction with Church Street / Norwich Road / Besthorpe Road*

The existing junction layout of Church Street / Norwich Road has Besthorpe Road and Church Street at cross angles to one another as illustrated in Figure 9.4 below which illustrates the existing junction layout. Movements from Besthorpe Road are restricted to the left turn onto Surrogate Street which is one-way southbound. A number of options have been considered for amending this junction to accommodate two-way traffic between Norwich Road and Surrogate Street and HGV movements.

**Figure 9.4 – Surrogate Street / Norwich Road / Church Street Junction – Existing Layout**


Non-motorised modes also need considering i.e. pedestrians and cyclists when looking at options for designing the new junction, as such each option will be appraised with all road users in mind.

### *Priority Junction*

In this location it is feasible that an improved priority junction can be implemented which would facilitate two-way traffic between Norwich Road and Surrogate Street. Such a junction type could be implemented through a number of simple changes at relatively low cost and would also enable right turns to be made from Besthorpe Road. Uncontrolled crossing points on Besthorpe Road and Church Street could be provided.

The junction modelling undertaken indicates that this junction type would operate over capacity in all the future year Do-Something Town Centre scenarios but is also shown to operate well until 2021 with the addition of either link road option. An indicative road layout for this option is provided as Drawing CS059912-01-002C in Appendix HH, Figure 1.

### *Roundabout*

As per the Connaught Road / Station Road junction, this location has a very large area, large enough for a fixed roundabout if the land outside of the Royal Garden Restaurant is available as highway or converted to such. Alternatively, a mini-roundabout would fit within the extents of the existing highway but would not provide the same regulation and control as a fixed roundabout. Again, pedestrian facilities could be introduced in the form of uncontrolled crossing points on each arm of the junction.

The junction modelling undertaken indicates that this junction type would work well in the Do-Something Town Centre scenarios until 2021. The junction operates better with the addition of either link road option, but still remains over capacity in nearly all the future year scenarios. An indicative road layout for this option is provided as Drawing CS059912-01-003C in Appendix HH, Figure 2.

### *Traffic Signal Control*

The introduction of signals would require the removal of at least one of the existing traffic islands and is likely to involve significant costs due to the amount of specialist equipment required. Swept path analysis has shown that there are no turning circle issues relating to large vehicles for any of the permitted movements.

Pedestrians would benefit from their own phase within the signals operation, making it safer when crossing each arm of the junction. Cyclists can also be catered for either as part of the same phase as pedestrians, in a separate phase of their own to facilitate crossing from Surrogate Street to Norwich Road, or their movements could run alongside the general traffic movements and could be assisted through the use of advanced stop lines.

The junction modelling undertaken indicates that this junction type would work well in the Do-Something Town Centre scenarios until 2021 in the evening peak but is also shown to operate well until 2028 with the addition of either link road option. This option operates with the lowest queues of all three options for the junctions in both the Do-Something Town Centre scenarios and either link road option. An indicative road layout for this option is provided as Drawing CS059912-01-004C in Appendix HH, Figure 3.

***Proposed Measures – Norwich Road / Surrogate Street / Church Street***

It is recommended that a suitable junction type be delivered which will adequately accommodate likely future traffic demands whilst safely and efficiently accommodating other road users. Each of the options considered has its own merits. However, it is considered that in terms of the overall flexibility offered along with the levels of priority afforded to public transport, pedestrians and cyclists that a signalised junction would offer the greatest benefit in this location.

A signalised junction is likely to be the safest option for all road users and will conform to design standards and will allow all users of the junction to have sufficient time to exit the junction. The use of signal control at this junction would also enable the intelligent linking with other signalised crossings and junctions within Attleborough.

### *9.5.6 Restricted HGV Access to the Town Centre*

As shown in the baseline conditions section there is currently a large number of HGVs currently using the one-way system through Attleborough town centre. The consultation responses reviewed also indicate that this is a particular concern for local residents. High numbers of HGVs passing along a historic town centre street with high levels of pedestrian and frontage activity is inappropriate and blights the environment within the town centre conservation area. It is considered that Exchange Street and Church Street are most affected given that these are the streets where most of the town centre business and retail activity occurs. The streets therefore accommodate on-street parking, loading and unloading, significant volumes of vehicular traffic (including a high percentage of HGVs), bus stops and significant levels of pedestrian and cycle activity.

***Proposed Measures – Town Centre HGV Restrictions***

It is recommended that HGV restrictions be introduced in conjunction with two-way traffic being introduced on Connaught Road and Surrogate Street. The junction layouts designed for the various options considered have all been designed to accommodate articulated goods vehicles and as such movements between the Maurice Gaymer and Bunns Bank employment site and the A11 can be accommodated without needing to travel along Exchange Street or Church Street.

It is unlikely that a total HGV ban could be introduced due to the servicing and deliveries required at the businesses accessed from these streets. Some level of enforcement may be required in order to ensure any bans are adhered to, although given the improved level of convenience offered by introducing two-way traffic flow on Connaught Road and Surrogate Street it is considered that any ban restricting access to Exchange Street and Church Street is unlikely to need enforcing.

Whilst the introduction of two-way running on Surrogate Street and Connaught Road facilitates the introduction of HGV restrictions on Exchange Street and Church Street it could also be

considered that introducing large numbers of HGVs onto Surrogate Street and Connaught Road would also be inappropriate, particularly given that these roads are also within the town centre conservation area and are likely to offer limited carriageway widths for HGVs to pass comfortably. It is therefore recommended that a 20mph speed limit be introduced within the town centre. This would also be consistent with any aspirations to improve public realm such as through the introduction of a shared surface scheme as discussed further below.

It is also recommended that on completion of an Eastern Link Road that the HGV restrictions be extended to include Connaught Road and if feasible (given the likely demand for movements between Norwich and the employment estates to the south of the railway line) also on Surrogate Street.

### *Alternative Measures – Town Centre One-Way System and Junctions*

*Shared Surface Scheme*

Whilst the recommendations above are based on extensive traffic modelling and sound engineering principals, the introduction of Manual for Streets guidance and influences from abroad have brought about a new way of thinking as regards highway design. In conventional streets, behaviour is governed by highway infrastructure such as traffic signs, road markings and other street furniture. In streets with shared space much of this infrastructure is removed.

Shared space schemes have become increasingly popular with councils wanting to regenerate local high streets. It is up to councils to decide whether or not to use shared space on their roads and should only do so where schemes are well designed and can be easily used. The government released guidance on the design of shared use spaces in 2011 in Local Transport Note 1/11. However, it is apparent from this guidance that there is a broad range of methods and materials which can be used in the implementation of such a scheme.

It is considered that the historic town centre of Attleborough would lend itself well to such a scheme although a more detailed study would be required to determine the likely approach, costs, extents and materials to be used in implementing such a scheme within Attleborough town centre.

*Low Cost Alternative*

The traffic modelling undertaken for individual junctions using demand flows indicates that signalised junctions operate most effectively. However, alternative junction layouts (priority and roundabouts) also perform reasonably well, particularly under Town Centre with Link Road Option 3 scenarios and as such alternative junction layouts could be used as a ‘low cost’ alternative although such junction types are unlikely to deliver the same benefits for pedestrians, cyclists and public transport users.

In light of the modelling results which demonstrate significant diversionary effects of the Link Road proposals it may be feasible to consider retaining the current one-way system within the town centre but with HGV restrictions in place. However, it is likely that the Link Road would need to be delivered earlier which may not be achievable given the likely need to fund from pooled or accumulated developer contributions. No modelling has been undertaken to assess such an option for the local highway network.

# 10. Recommended Strategy

## 10.1 Overview

Section 9 summarises the impacts of the individual options on the network performance. It is evident from the results presented that the preferred package of highway network improvements does not fully solve the transport problems faced by Attleborough assuming central growth. However, the network improvement schemes are shown to almost fully mitigate the impacts of development when assuming low growth as can be seen from the average speed graphs provided in Appendix S Figure 2 which show that in each future year the average speed of travel on the network returns towards the do-nothing situation with the inclusion of town centre improvements and a new link road. It is also evident that the second link road option for the higher speed 'wrap around' link road offers the greatest mitigation effect.

It is considered that the adoption of low growth assumptions is likely to reflect the effects of some complimentary demand management measures consistent with the requirement that any preferred strategy for the town centre should be seen to fully consider the needs of all road users. As such it is recommended that a full package of network infrastructure improvements be implemented alongside a package of smarter choices proposals which improve the infrastructure and facilities available to pedestrians, cyclists and public transport users.

## 10.2 Highway Network Infrastructure

The outputs from the various traffic modelling scenarios clearly demonstrate that alterations to the town centre network which introduce two-way traffic to Surrogate Street and Connaught Road improve network operation. In the low growth scenarios the 'Do-Something' with town centre schemes show higher average vehicle speeds in all but the 2031 scenarios when it would appear that the changes cease to be effective (without a link road in place).

However, in consideration of the fact that the alterations to the town centre network are shown to offer some mitigating effects up to 2028 in terms of average journey times and average speeds on the network it is likely that such changes to the network could offset the impacts of development traffic in the initial years. The following paragraphs consider how far into the future the town centre proposals could support future development without the need for further highway network infrastructure. i.e. a new western link road.

In 2021, the average speed in the PM peak hour is shown to be 42km/h with the town centre changes in place which is marginally slower (44km/h) than the do-nothing but a significant improvement as compared to the do-minimum (34km/h). By 2024 the average speed in the PM peak with the town centre changes drops to 26km/h which still indicates some mitigating effects as compared to the do-minimum (20km/h) but is well short of fully mitigating the impacts of development with the do-nothing average speeds being significantly higher (42km/h). **It is therefore considered that the town centre changes are capable of mitigating the impacts of development up to 2021.**

The 2024 results indicate that further highway network infrastructure is required to support continued development beyond 2021. It is apparent that in terms of the overall operation of the network that both link road options have a significant effect on reducing congestion and form an essential element of the package of measures required to support future growth beyond 2021.

In the 2024 PM peak the average speeds of 47kp/h and 52km/h for the 'Town Centre with Link Road 1/2' and 'Town Centre with Link Road 3' options respectively are both higher than the do-nothing average speeds indicating that either link road option would more than mitigate the impacts of development on the local network.

However, in the 2028 PM peak only the average speed of the 'Town Centre with Link Road Option 3' scenario suggest full mitigation with an average speed of 41km/h as compared with a do-nothing average speed of 40km/h and a do-minimum average speeds of 16km/h.

Neither of the link road options fully mitigates the impact of development traffic with 'Town Centre with Link Road Option 3' coming closest with a PM peak average speed at 33km/h as compared with a do-nothing average speed of 38km/h a do-minimum average speed of 12km/h and a 'Town Centre with Link Road Option 1/2' average speed of 22km/h. **It is therefore considered that the Link Road Option 3 should be delivered by 2024 in order to support planned development beyond 2021.**

It should be noted that the mitigation effects are based on returning average speeds to the do-nothing scenario of the corresponding year. It is expected that there is likely to be some residual deterioration of local highway network performance arising as a consequence of background growth. This is apparent when comparing the 2012 base year average speeds of 45km/h and 40km/h with the 2031 do-nothing average speeds of 34km/h and 33km/h for the AM and PM peak hours respectively.

## 10.3 Demand Management Measures and Smarter Choices

The average speed results presented in the previous paragraphs are taken from future year modelling based on low growth assumptions. It is apparent that even though optimistic development assumptions have been applied (low growth) that the highway network infrastructure improvements do not fully offset the impacts of development. In order that the impacts of background traffic growth and the residual impacts of development can be offset it is considered that a complementary package of demand management and smarter choices measures also be implemented to support the development which will act to discourage single occupancy private car use and actively promote active travel and public transport modes.

It is considered that such measures should be implemented as soon as practicable. The package of complimentary measures is detailed in Section 9 but can be summarised as follows:

- General service improvements on the commercial public transport network
- Improvements to bus stops to appropriate standards
- Improvements to walking and cycling networks particularly railway crossings
- Improvements to the walking and cycling environment within the town centre
- Review of parking policy and provision within the town centre
- Marketing and promotion of smarter choices within the town centre including the implementation of travel plans

Whilst the impact of such measures have not been fully considered within the highway impact assessment presented within this report it is considered that mode share targets in line with those presented in the Smarter Choices report should be achieved to ensure the delivery of the Link Road is not required prior to 2024.

## 10.4 Objectives Based Appraisal

It is important that any strategy coming forward for the town centre not only addresses the problems facing the transport system within the town centre but also aligns with the policy objectives. A review of the various policy documents which impact on town centre transport issues has been provided in Section 4 of this report. A summary of how the recommended package of measures fits in with National, local and study objectives is provided in Appendix II

and demonstrates that the strategy aligns well with the land use planning, sustainable transport and economic development policies and would be an appropriate approach to achieving the key objectives of the emerging Breckland Local Plan and this studies vision.

All of the objectives identified have a common thread of preparing Attleborough for growth. This study has sought to address the issues brought about by this growth in order to ensure that the transport infrastructure can cope in the future. This has primarily been done through the transport modelling and inclusion of growth estimates and changes in distribution brought about by the proposed developments in the town centre and the surrounding area.

## 10.5 Funding Opportunities

Despite the range of funding streams available it is likely that much of the infrastructure identified will need to be funded by developer contributions and/or Norfolk's Local Transport Plan allocations which recognise that investment in new infrastructure will be focused on a small number of strategic improvements linked to major housing or economic growth and strategic connections.

The work contained within this study could also be used to support funding bids to the Local Enterprise Partnership/Local Transport Board which are set to make decisions on local transport spending from 2015. The £2 billion Single Local Growth Fund will be launched in 2015/16 with funding allocated to Local Enterprise Partnerships on the basis of 'growth deals' negotiated with Government. £1.1billion of the funding will come from transport with £819 million allocated from local authority transport majors, £200 million from the integrated transport block, and £100 million from the Local Sustainable Transport Fund.

There may also be further opportunities for central government funding through the Department for Transports Local Pinch Point Fund as demonstrated recently. In order to obtain the funding necessary for the implementation of the highway network infrastructure elements presented in this strategy through the Department for Transport or Local Enterprise Partnership it is likely that further detailed studies of the individual components will be required.

This section briefly identifies some of the potential funding streams that could be available to implement these schemes. The funding sources identified do not form an exhaustive list, but represent some of the more significant funding opportunities coming forward to finance any options going forward.

## 10.6 Implementation Plan

### *10.6.1 Priorities for Action*

This study aims to identify the transport problems within the area in and around Attleborough town centre and define a transport strategy for Attleborough town centre to support significant plans for growth. The recommended strategy has been presented in the previous chapters and contains several elements that need to be prioritised in order to ensure that implementation of the strategy can be achieved.

The remainder of this section considers the potential implementation programme for the recommended strategy in order to highlight any issues for additional consideration and to outline a potential way forward. The priorities for action have been summarised below and are expanded upon throughout this final section.

The first priority is to determine an appropriate phasing strategy plan. In order to do this it is essential to identify an appropriate programme for delivery. This needs to be closely aligned with the anticipated trajectories for housing and employment growth in the area and also relate to the findings of the modelling work undertaken for this study.

The second priority that exists is to begin to establish an estimate of the cost of each of the schemes. At this stage this will only consist of outline costs for each of the schemes as more accurate costing will be established through more detailed study.

The third priority includes developing the funding strategy in detail so that the work can be programmed that will be necessary to ensure that robust mechanisms are in place to secure developer contributions or to make up funding bids as appropriate.

It is important that, at this stage, the resources required not only to work on the feasibility stages of the projects but also to deliver the schemes is identified. This will be an important consideration, as delivering the entire strategy in the first 5 years (based on the housing trajectory programme outlined below) of the programme will place a significant pressure on resources. Implementing the strategy over this short time period could also affect the operation of the transport network, with temporary disruption that could be caused by constructing the package elements.

For all the priorities outlined above, a risk assessment element will need to be incorporated so that the town partners are aware at all times of the implications of certain aspects not being delivered, funding to be approved or other issues that could affect the delivery of the strategy.

In order to assist in developing the focus for this strategy an implementation plan has been developed which is shown in Appendix JJ. This indicates for each of the schemes the objectives that it satisfies, approximate cost range, potential delivery mechanism and an outline programme. Each of these areas is discussed in more detail below.

## 10.7 Phasing

The recommended strategy contains schemes that will need to come online at various stages of the study period up to 2031. The strategy currently contains schemes that could be implemented relatively quickly with little or no disruption to the network, effectively equating to ‘quick wins’.

There are also some schemes which will require detailed studies and long construction periods, so these will have to be considered for delivery over a longer period. There are also schemes which are reliant on factors outside the scope of this study and for which approval of the strategy will have little impact in ensuring their implementation, such as new and improved bus services. It is also important that as many as possible of the schemes recommended within this study are supportive of a step change improvement to Attleborough’s town centre transport network which will deliver improved accessibility whilst at the same time delivering reduced car reliance.

## 10.8 Scheme Costing

At this stage it is only possible to provide outline scheme costs. Until the detailed analysis of each of the schemes is undertaken it is difficult to define exact figures for most package elements. Approximate costs for each of the component parts of the recommended strategy are outlined below although these should be considered broad estimates given the level of uncertainty and detail associated with the strategy elements at this stage.

### *10.8.1 Town Centre Highway Network*

The following costs are provided for network improvements to the town centre one-way system so that two-way traffic can be introduced to Surrogate Street and Connaught Road. Costs are presented for the alternative junction layouts considered within the junction modelling undertaken.

**Table 10.1 – Town Centre Highway Network Improvements**

| Junction | Priority | Roundabout | Signals |
|---|---|---|---|
| Junction 1: Connaught Road / Exchange Street | £51,500 | £72,600 | £286,000 |
| Junction 2: Surrogate Street / Church Street | £43,200 | £36,400 | £342,300 |
| Junction 3: Station Road / Connaught Road | £24,200 | £31,000 | £304,100 |
| **TOTAL** | **£118,900** | **£140,000** | **£932,400** |

The cost estimates presented in Table 10.1 above assume that no land purchase is required and does not include any allowance for diversions of statutory undertaker equipment. The costs do however include for localised widening on Connaught Road and Surrogate Street to accommodate two-way traffic. The bill of quantities estimates prepared has been based on Volume 4 of the Manual of Contract Documents for Highway Works and is provided as Appendix KK.

In the interest of providing a robust cost estimate taking account of possible diversions of statutory undertakers' equipment, land purchase and associated legal costs it is considered that a 60% optimism bias should be applied to these cost estimates. The resulting estimates are provided in Table 10.2 below.

**Table 10.2 - Town Centre Highway Network Improvements including 60% Optimism Bias**

| Junction | Priority | Roundabout | Signals |
|---|---|---|---|
| Junction 1: Connaught Road / Exchange Street | £82,400 | £116,160 | £457,600 |
| Junction 2: Surrogate Street / Church Street | £69,120 | £58,240 | £547,680 |
| Junction 3: Station Road / Connaught Road | £38,720 | £49,600 | £486,560 |
| **TOTAL** | **£190,240** | **£224,000** | **£1,491,840** |

### *10.8.2 Smarter Choices / Demand Management Strategy*

The smarter choices strategy report provides cost estimates for a package of smarter choices measures for the town centre. Having considered these proposals against the recommended strategy for the town centre it is evident that measures T16 and T37 from the Smarter Choices would be duplicated. In light of this the estimated cost of smarter choices measures for the town centre amounts to **£276,355**.

In addition to the physical measures certain elements of the demand management strategy would also need some additional study work to be undertaken. For example a study is likely to be required to establish the scope of the parking policy review.

The proposals outlined in this report suggest that a parking policy review should be undertaken and do not give any detail about what the outcome of such a review would be. For this reason it is only considered appropriate at this stage to put forward the approximate cost of such a study. Although only an outline cost, it is anticipated that a parking policy review within Attleborough would cost approximately **£15,000**. This would include a full review of existing policy, car park survey and user perception surveys, analysis of results and developments of an appropriate strategy, including an element of consultation.

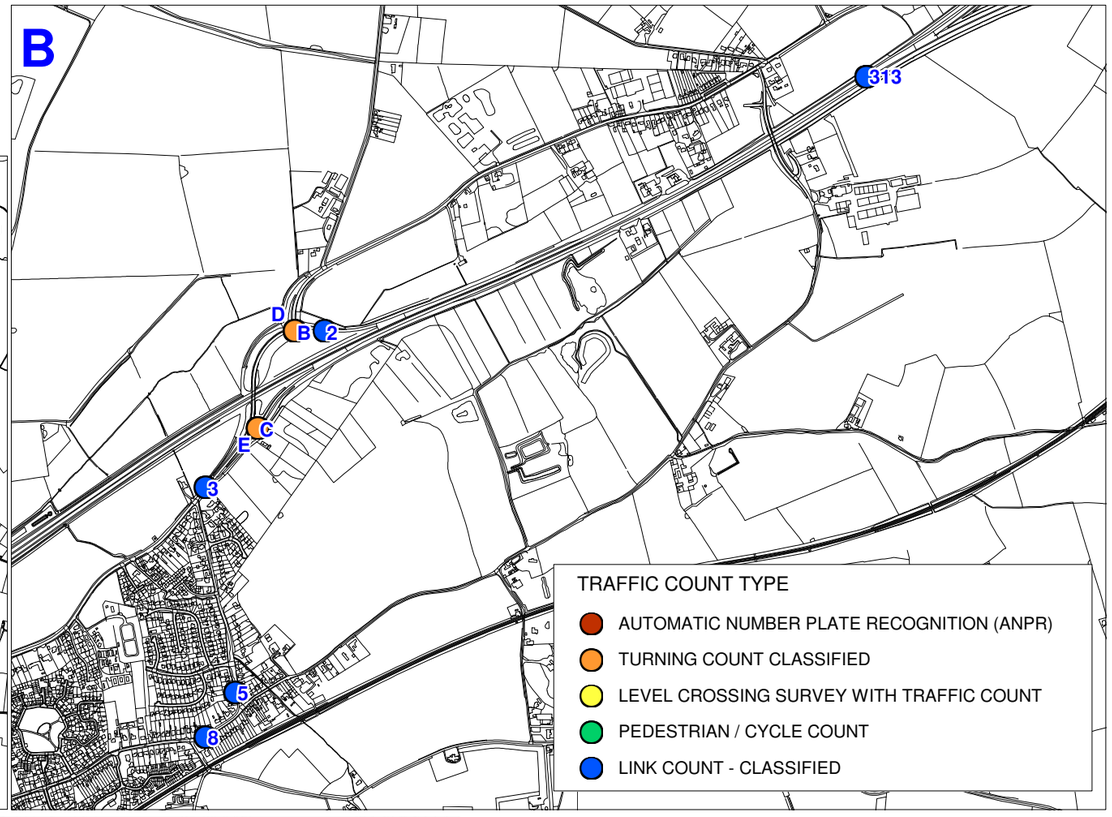
The updated parking strategy arising from the policy review would also need to be implemented. Some of these monies could be recovered through a modified charging and enforcement regime but some upfront capital costs would arise, signing, charging machines, improvement to specific car parks, enforcement etc.

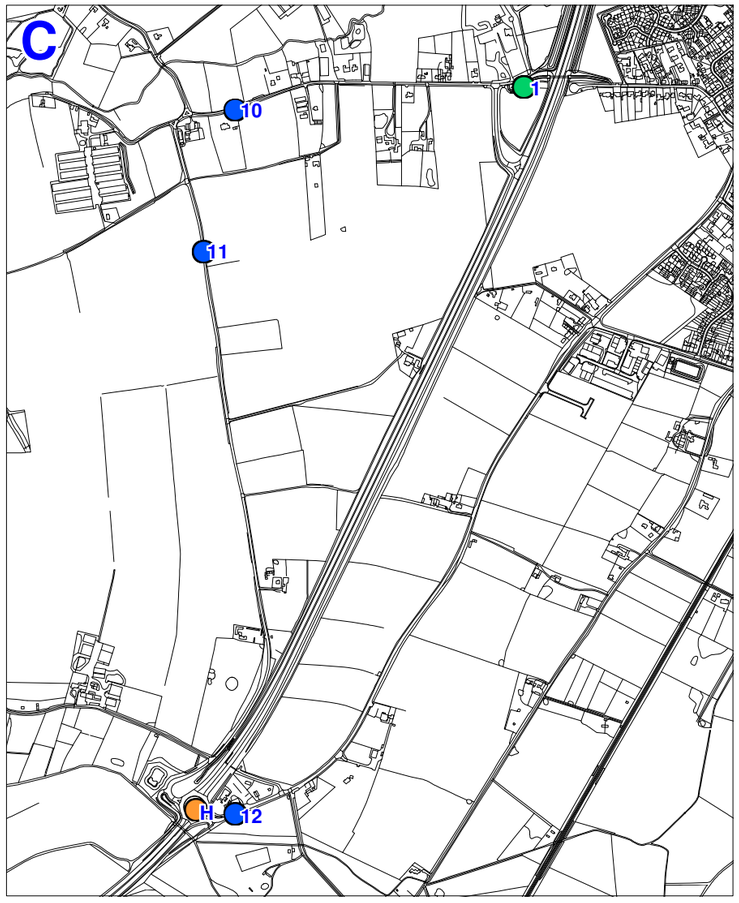
It is envisaged that the implementation of travel plans and the marketing and promotion of smarter choices would be delivered through existing council budgets.

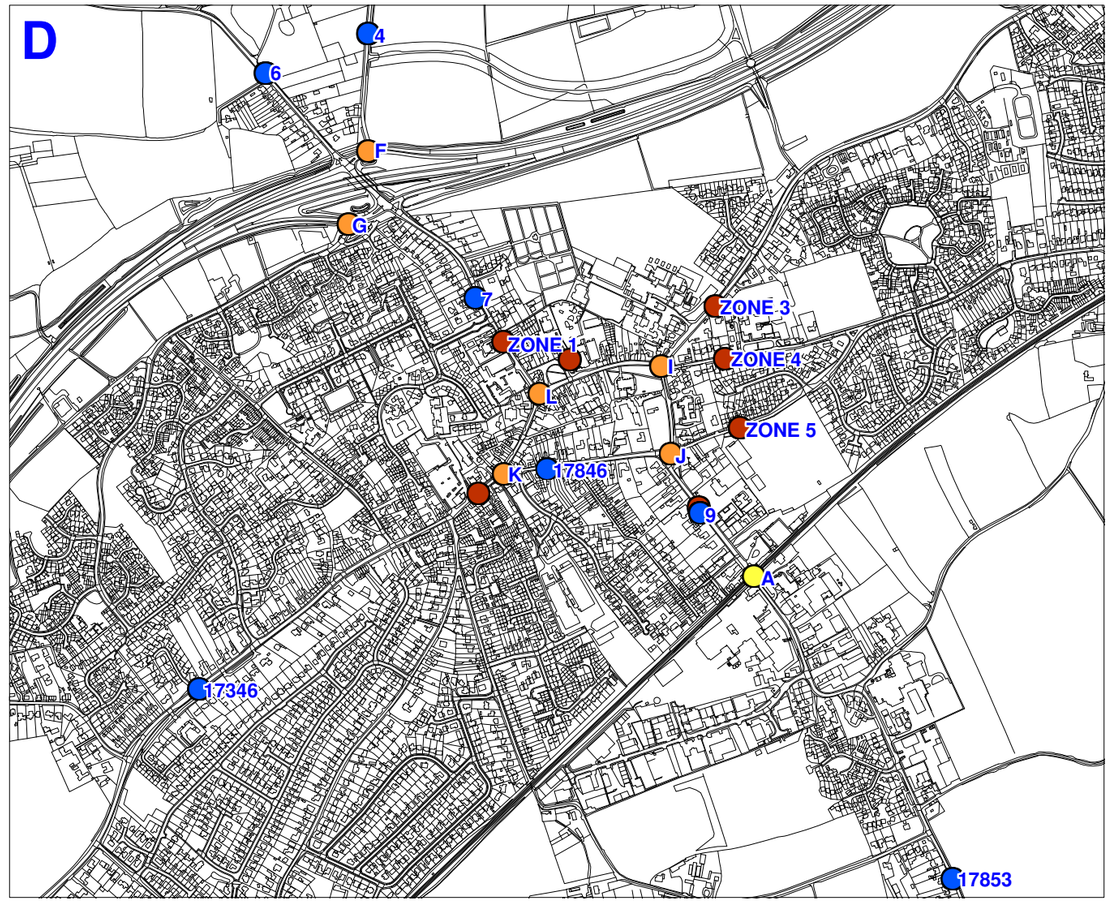
# Appendix A – Traffic Count Locations

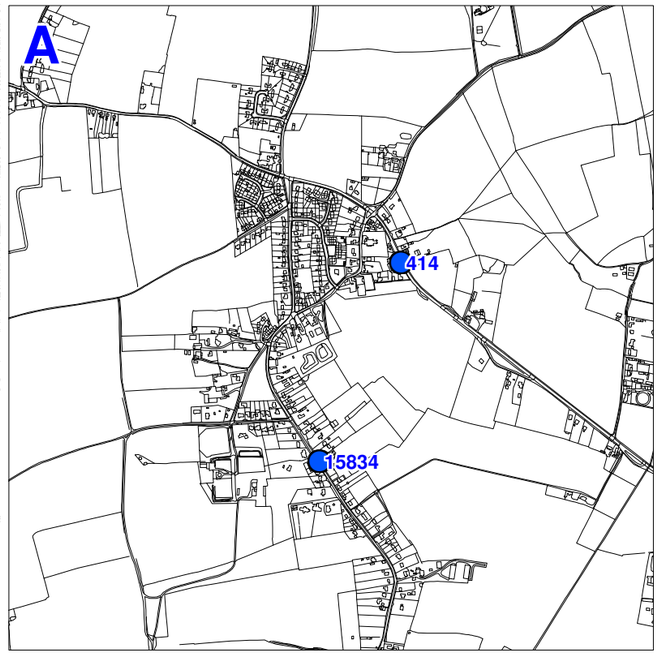
| REF | LOCATION | EASTING | NORTHING | TYPE | TYPE_REF | DATE | NOTES | |
|---|---|---|---|---|---|---|---|---|
| 414 | B1077 ATTLEBOROUGH RD GT ELLINGHAM | 602,126 | 297,103 | LINK - CLASSIFIED | 1 | From 01/01/2011 To 01/01/2012 | | |
| 313 | A11 BESTHORPE BYPASS BESTHORPE | 607,685 | 297,453 | LINK - CLASSIFIED | 1 | From 01/01/2010 To 01/01/2011 | | |
| 17853 | BUCKENHAM ROAD, ATTLEBOROUGH | 605,557 | 294,380 | LINK - CLASSIFIED | 1 | From 21/02/2009 To 27/02/2009 | | |
| 17846 | B1077 CONNAUGHT ROAD | 604,727 | 295,220 | LINK - CLASSIFIED | 1 | From 23/01/2009 To 02/02/2009 | SINGLE DIRECTION - ONE WAY STREET? | |
| 17346 | C572 LONDON ROAD | 604,014 | 294,769 | LINK - CLASSIFIED | 1 | From 27/06/2008 To 27/06/2008 (12 Hrs) | | |
| 15834 | C136 LONG STREET, GRAT ELLINGHAM | 601,892 | 296,531 | LINK - CLASSIFIED | 1 | From 05/09/2007 To 02/10/2007 | | |
| 1 | WEST CARR BRIDGE | 603,305 | 294,740 | PED/CYCLE | 2 | From 06/03/2012 To 06/03/2012 | PEDESTRIAN/CYCLES/EQUESTRIANS | |
| 2 | NORWICH (A11 ON SLIP) | 606,230 | 296,770 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 3 | NORWICH ROAD B'WEEN MILL LANE & A11 OFF SLIP | 605,910 | 296,350 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 4 | DEOPHAM ROAD N'TH OF A11 ON SLIP | 604,360 | 296,110 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 5 | MILL LANE N'TH OF SILVER STREET | 605,990 | 295,800 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 6 | ELLINGHAM ROAD S'TH OF WARREN LANE | 604,150 | 296,030 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 7 | QUEENS ROAD B'WEEN A11 SLIP ROAD 7 QUEENS COURT | 604,580 | 295,570 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 8 | SILVER STREET EAST OF WHITE HORSE LANE | 605,910 | 295,680 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 9 | STATION ROAD B'WEEN CONNAUGHT ROAD & NEW NORTH ROAD | 605,040 | 295,130 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 10 | WEST CARR ROAD EAST OF LONG STREET | 602,570 | 294,680 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 11 | WROO ROAD B'WEEN SWANGEY LANE & A11 | 602,490 | 294,320 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| 12 | B1077 LONDON ROAD EAST OF A11 | 602,570 | 292,890 | LINK - CLASSIFIED | 1 | From 02/03/2012 To 16/03/2012 | | HA |
| A | LEVEL CROSSING STUDY | 605,150 | 295,000 | LEVEL CROSSING | 3 | From 10/12/2010 To 10/12/2012 | | HA |
| B | NORWICH ROAD JUNCTION WITH A11 ON SLIP | 606,150 | 296,770 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| C | NORWICH ROAD JUNCTION WITH A11 OFF SLIP | 606,050 | 296,510 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| D | QUEENS ROAD JUNCTION WITH A11 SLIPS (NORTHSIDE) | 606,150 | 296,770 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| E | QUEENS ROAD JUNCTION WITH A11 SLIPS (SOUTHSIDE) | 606,050 | 296,510 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| F | DEOPHAM ROAD JUNCTION WITH A11 SLIP ROAD | 604,360 | 295,870 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| G | BLACKTHORN ROAD JUNCTION WITH A11 SLIP ROAD | 604,320 | 295,720 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| H | A11 JUNCTION WITH LONDON ROAD (QUARRY AREA) | 602,470 | 292,900 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| I | NORWICH ROAD / BESTHORPE ROAD / SURROGATE STREET | 604,960 | 295,430 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| J | THIEVES LANE / SURROGATE STREET / STATION ROAD | 604,980 | 295,250 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| K | CONNAUGHT ROAD / HIGH STREET / EXCHANGE STREET | 604,638 | 295,209 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| L | QUEENS ROAD / EXCHANGE STREET / CHURCH STREET / CAR PARK | 604,711 | 295,373 | TURN - CLASSIFIED | 4 | From 10/10/2007 To 10/10/2007 | | BIDWELL |
| ZONE 1 | B1077 QUEENS ROAD | 604,637 | 295,480 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 2 | QUEENS SQUARE CAR PARK | 604,773 | 295,443 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 3 | NORWICH ROAD | 605,071 | 295,553 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 4 | BESTHORPE ROAD | 605,091 | 295,445 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 5 | THIEVES LANE | 605,121 | 295,304 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 6 | B1077 STATION ROAD | 605,037 | 295,141 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| ZONE 7 | HIGH STREET | 604,586 | 295,169 | ANPR | 5 | From 07/10/2009 To 07/10/2009 | | BIDWELL |
| TA1 | LONDON ROAD / A11 | 602,470 | 292,900 | TURN - CLASSIFIED | 4 | From 28/01/2010 To 28/01/2010 | | MLM |
| TA2 | DODDS ROAD / LONDON ROAD | 603,810 | 294,450 | TURN - CLASSIFIED | 4 | From 28/01/2010 To 28/01/2010 | | MLM |
| TA3 | HIGH STREET / CONNAUGHT STREET | 604,638 | 295,209 | TURN - CLASSIFIED | 4 | From 28/01/2010 To 28/01/2010 | | MLM |

# EXISTING TRAFFIC COUNT SITES
# ATTLEBOROUGH TRANSPORT STUDIES


CAPITA

# Appendix B – Turning Count Data

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 ON SLIP

ARM: NORWICH ROAD (WEST)

| TIME / CLASS | LEFT TO NORWICH ROAD (NORTH) | | | | | | | STRAIGHT TO A11 SLIP | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 32 | 2 | 1 | 0 | 2 | 37 | 0 | 64 | 8 | 0 | 0 | 0 | 72 | 109 |
| 7:15 - 7:30 | 0 | 37 | 0 | 0 | 0 | 1 | 38 | 0 | 67 | 3 | 1 | 0 | 0 | 71 | 109 |
| 7:30 - 7:45 | 0 | 28 | 1 | 0 | 0 | 1 | 30 | 1 | 76 | 5 | 0 | 1 | 0 | 83 | 113 |
| 7:45 - 8:00 | 0 | 25 | 2 | 0 | 1 | 1 | 29 | 0 | 64 | 6 | 0 | 0 | 0 | 70 | 99 |
| HOURLY TOTAL | 0 | 122 | 5 | 1 | 1 | 5 | 134 | 1 | 271 | 22 | 1 | 1 | 0 | 296 | 430 |
| 8:00 - 8:15 | 1 | 18 | 1 | 1 | 0 | 1 | 22 | 0 | 57 | 9 | 0 | 0 | 0 | 66 | 88 |
| 8:15 - 8:30 | 0 | 28 | 2 | 0 | 0 | 0 | 30 | 0 | 45 | 5 | 0 | 1 | 1 | 52 | 82 |
| 8:30 - 8:45 | 0 | 14 | 4 | 0 | 0 | 0 | 18 | 0 | 46 | 7 | 2 | 1 | 1 | 57 | 75 |
| 8:45 - 9:00 | 0 | 12 | 1 | 0 | 0 | 1 | 14 | 0 | 43 | 5 | 1 | 0 | 0 | 49 | 63 |
| HOURLY TOTAL | 1 | 72 | 8 | 1 | 0 | 2 | 84 | 0 | 191 | 26 | 3 | 2 | 2 | 224 | 308 |
| PERIOD TOTAL | 1 | 194 | 13 | 2 | 1 | 7 | 218 | 1 | 462 | 48 | 4 | 3 | 2 | 520 | 738 |
| 16:30 - 16:45 | 0 | 33 | 1 | 0 | 0 | 0 | 34 | 0 | 45 | 9 | 1 | 0 | 0 | 55 | 89 |
| 16:45 - 17:00 | 0 | 24 | 1 | 0 | 0 | 0 | 25 | 0 | 34 | 3 | 4 | 0 | 0 | 41 | 66 |
| 17:00 - 17:15 | 0 | 33 | 2 | 0 | 0 | 0 | 35 | 0 | 63 | 6 | 1 | 0 | 0 | 70 | 105 |
| 17:15 - 17:30 | 0 | 26 | 2 | 0 | 0 | 1 | 29 | 0 | 57 | 5 | 2 | 0 | 1 | 65 | 94 |
| HOURLY TOTAL | 0 | 116 | 6 | 0 | 0 | 1 | 123 | 0 | 199 | 23 | 8 | 0 | 1 | 231 | 354 |
| 17:30 - 17:45 | 0 | 25 | 1 | 1 | 0 | 0 | 27 | 1 | 65 | 9 | 2 | 0 | 1 | 78 | 105 |
| 17:45 - 18:00 | 1 | 21 | 1 | 0 | 0 | 1 | 24 | 0 | 36 | 6 | 0 | 0 | 0 | 42 | 66 |
| 18:00 - 18:15 | 0 | 17 | 2 | 0 | 0 | 0 | 19 | 0 | 33 | 4 | 0 | 0 | 0 | 37 | 56 |
| 18:15 - 18:30 | 0 | 15 | 2 | 0 | 0 | 0 | 17 | 0 | 42 | 3 | 0 | 0 | 0 | 45 | 62 |
| HOURLY TOTAL | 1 | 78 | 6 | 1 | 0 | 1 | 87 | 1 | 176 | 22 | 2 | 0 | 1 | 202 | 289 |
| PERIOD TOTAL | 1 | 194 | 12 | 1 | 0 | 2 | 210 | 1 | 375 | 45 | 10 | 0 | 2 | 433 | 643 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 ON SLIP

ARM: NORWICH ROAD (NORTH)

| TIME / CLASS | LEFT TO A11 SLIP | | | | | | | RIGHT TO NORWICH ROAD (WEST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 3 | 1 | 1 | 0 | 0 | 5 | 0 | 18 | 3 | 0 | 0 | 0 | 21 | 26 |
| 7:15 - 7:30 | 0 | 2 | 2 | 0 | 0 | 0 | 4 | 0 | 14 | 3 | 0 | 0 | 0 | 17 | 21 |
| 7:30 - 7:45 | 0 | 4 | 1 | 1 | 0 | 0 | 6 | 0 | 21 | 4 | 1 | 0 | 0 | 26 | 32 |
| 7:45 - 8:00 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 0 | 41 | 3 | 0 | 0 | 1 | 45 | 50 |
| HOURLY TOTAL | 0 | 13 | 5 | 2 | 0 | 0 | 20 | 0 | 94 | 13 | 1 | 0 | 1 | 109 | 129 |
| 8:00 - 8:15 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 41 | 5 | 0 | 0 | 0 | 46 | 49 |
| 8:15 - 8:30 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 33 | 2 | 1 | 0 | 3 | 39 | 42 |
| 8:30 - 8:45 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 23 | 2 | 0 | 0 | 2 | 27 | 31 |
| 8:45 - 9:00 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 29 | 2 | 0 | 0 | 0 | 31 | 33 |
| HOURLY TOTAL | 0 | 10 | 2 | 0 | 0 | 0 | 12 | 0 | 126 | 11 | 1 | 0 | 5 | 143 | 155 |
| PERIOD TOTAL | 0 | 23 | 7 | 2 | 0 | 0 | 32 | 0 | 220 | 24 | 2 | 0 | 6 | 252 | 284 |
| 16:30 - 16:45 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 24 | 5 | 0 | 0 | 0 | 29 | 33 |
| 16:45 - 17:00 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 23 | 2 | 0 | 0 | 1 | 26 | 30 |
| 17:00 - 17:15 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 39 | 2 | 0 | 0 | 1 | 42 | 45 |
| 17:15 - 17:30 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 37 | 8 | 0 | 0 | 0 | 45 | 49 |
| HOURLY TOTAL | 0 | 13 | 2 | 0 | 0 | 0 | 15 | 0 | 123 | 17 | 0 | 0 | 2 | 142 | 157 |
| 17:30 - 17:45 | 0 | 5 | 1 | 0 | 0 | 0 | 6 | 0 | 35 | 4 | 1 | 0 | 1 | 41 | 47 |
| 17:45 - 18:00 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 29 | 4 | 1 | 0 | 1 | 35 | 38 |
| 18:00 - 18:15 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 21 | 3 | 0 | 0 | 1 | 25 | 26 |
| 18:15 - 18:30 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 24 | 2 | 0 | 0 | 0 | 26 | 28 |
| HOURLY TOTAL | 0 | 8 | 4 | 0 | 0 | 0 | 12 | 0 | 109 | 13 | 2 | 0 | 3 | 127 | 139 |
| PERIOD TOTAL | 0 | 21 | 6 | 0 | 0 | 0 | 27 | 0 | 232 | 30 | 2 | 0 | 5 | 269 | 296 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 ON SLIP

ARM: A11 SLIP

| TIME / CLASS | STRAIGHT TO NORWICH ROAD (WEST) | | | | | | | RIGHT TO NORWICH ROAD (NORTH) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:15 - 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 - 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 - 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:00 - 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:15 - 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:30 - 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:30 - 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:45 - 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00 - 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:15 - 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 - 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:45 - 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18:00 - 18:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18:15 - 18:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 OFF SLIP

ARM: NORWICH ROAD (NORTH)

| TIME / CLASS | LEFT TO A11 SLIP | | | | | | | STRAIGHT TO NORWICH ROAD (SOUTH) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 3 | 0 | 0 | 0 | 21 | 21 |
| 7:15 - 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 3 | 0 | 0 | 0 | 17 | 17 |
| 7:30 - 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 4 | 1 | 0 | 0 | 26 | 26 |
| 7:45 - 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 3 | 0 | 0 | 0 | 44 | 44 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 13 | 1 | 0 | 0 | 108 | 108 |
| 8:00 - 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 5 | 0 | 0 | 1 | 47 | 47 |
| 8:15 - 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 2 | 1 | 0 | 3 | 39 | 39 |
| 8:30 - 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 2 | 0 | 0 | 2 | 27 | 27 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 2 | 0 | 0 | 0 | 31 | 31 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 126 | 11 | 1 | 0 | 6 | 144 | 144 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 24 | 2 | 0 | 6 | 252 | 252 |
| 16:30 - 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 5 | 0 | 0 | 0 | 29 | 29 |
| 16:45 - 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 2 | 0 | 0 | 1 | 26 | 26 |
| 17:00 - 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 2 | 0 | 0 | 1 | 42 | 42 |
| 17:15 - 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 8 | 0 | 0 | 0 | 45 | 45 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 123 | 17 | 0 | 0 | 2 | 142 | 142 |
| 17:30 - 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 4 | 1 | 0 | 1 | 41 | 41 |
| 17:45 - 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 4 | 1 | 0 | 1 | 35 | 35 |
| 18:00 - 18:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 3 | 0 | 0 | 1 | 25 | 25 |
| 18:15 - 18:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 2 | 0 | 0 | 0 | 26 | 26 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 109 | 13 | 2 | 0 | 3 | 127 | 127 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 232 | 30 | 2 | 0 | 5 | 269 | 269 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 OFF SLIP

ARM: A11 SLIP

| TIME / CLASS | LEFT TO NORWICH ROAD (SOUTH) | | | | | | | RIGHT TO NORWICH ROAD (NORTH) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 50 | 10 | 1 | 2 | 0 | 63 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 64 |
| 7:15 - 7:30 | 0 | 62 | 9 | 1 | 1 | 0 | 73 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 75 |
| 7:30 - 7:45 | 1 | 65 | 5 | 1 | 0 | 0 | 72 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 74 |
| 7:45 - 8:00 | 0 | 59 | 4 | 1 | 1 | 0 | 65 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 66 |
| HOURLY TOTAL | 1 | 236 | 28 | 4 | 4 | 0 | 273 | 0 | 3 | 3 | 0 | 0 | 0 | 6 | 279 |
| 8:00 - 8:15 | 0 | 53 | 10 | 1 | 1 | 0 | 65 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 67 |
| 8:15 - 8:30 | 0 | 59 | 11 | 1 | 0 | 0 | 71 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 72 |
| 8:30 - 8:45 | 0 | 41 | 9 | 1 | 0 | 0 | 51 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 53 |
| 8:45 - 9:00 | 0 | 40 | 7 | 1 | 0 | 0 | 48 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 49 |
| HOURLY TOTAL | 0 | 193 | 37 | 4 | 1 | 0 | 235 | 0 | 4 | 2 | 0 | 0 | 0 | 6 | 241 |
| PERIOD TOTAL | 1 | 429 | 65 | 8 | 5 | 0 | 508 | 0 | 7 | 5 | 0 | 0 | 0 | 12 | 520 |
| 16:30 - 16:45 | 0 | 68 | 8 | 0 | 0 | 0 | 76 | 0 | 3 | 1 | 1 | 0 | 0 | 5 | 81 |
| 16:45 - 17:00 | 0 | 69 | 9 | 1 | 1 | 0 | 80 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 81 |
| 17:00 - 17:15 | 0 | 77 | 7 | 0 | 1 | 1 | 86 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 87 |
| 17:15 - 17:30 | 0 | 79 | 7 | 0 | 0 | 0 | 86 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 88 |
| HOURLY TOTAL | 0 | 293 | 31 | 1 | 2 | 1 | 328 | 0 | 5 | 1 | 3 | 0 | 0 | 9 | 337 |
| 17:30 - 17:45 | 0 | 84 | 3 | 1 | 0 | 0 | 88 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 93 |
| 17:45 - 18:00 | 0 | 77 | 5 | 0 | 0 | 0 | 82 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 85 |
| 18:00 - 18:15 | 1 | 56 | 3 | 0 | 1 | 0 | 61 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 62 |
| 18:15 - 18:30 | 0 | 60 | 4 | 0 | 0 | 0 | 64 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 66 |
| HOURLY TOTAL | 1 | 277 | 15 | 1 | 1 | 0 | 295 | 0 | 8 | 3 | 0 | 0 | 0 | 11 | 306 |
| PERIOD TOTAL | 1 | 570 | 46 | 2 | 3 | 1 | 623 | 0 | 13 | 4 | 3 | 0 | 0 | 20 | 643 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: NORWICH ROAD / A11 OFF SLIP

ARM: NORWICH ROAD (SOUTH)

| TIME / CLASS | STRAIGHT TO NORWICH ROAD (NORTH) | | | | | | | RIGHT TO A11 SLIP | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 96 | 9 | 1 | 0 | 2 | 108 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| 7:15 - 7:30 | 0 | 102 | 3 | 1 | 0 | 1 | 107 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 107 |
| 7:30 - 7:45 | 1 | 103 | 5 | 0 | 1 | 1 | 111 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 111 |
| 7:45 - 8:00 | 0 | 89 | 7 | 0 | 1 | 1 | 98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 98 |
| HOURLY TOTAL | 1 | 390 | 24 | 2 | 2 | 5 | 424 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 424 |
| 8:00 - 8:15 | 1 | 74 | 9 | 1 | 0 | 1 | 86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86 |
| 8:15 - 8:30 | 0 | 72 | 7 | 0 | 1 | 1 | 81 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 |
| 8:30 - 8:45 | 0 | 59 | 10 | 2 | 1 | 1 | 73 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 73 |
| 8:45 - 9:00 | 0 | 54 | 6 | 1 | 0 | 1 | 62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 |
| HOURLY TOTAL | 1 | 259 | 32 | 4 | 2 | 4 | 302 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 302 |
| PERIOD TOTAL | 2 | 649 | 56 | 6 | 4 | 9 | 726 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 726 |
| 16:30 - 16:45 | 0 | 75 | 9 | 0 | 0 | 0 | 84 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 84 |
| 16:45 - 17:00 | 0 | 58 | 4 | 3 | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 65 |
| 17:00 - 17:15 | 0 | 95 | 8 | 1 | 0 | 0 | 104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 104 |
| 17:15 - 17:30 | 0 | 82 | 7 | 1 | 0 | 2 | 92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 |
| HOURLY TOTAL | 0 | 310 | 28 | 5 | 0 | 2 | 345 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 |
| 17:30 - 17:45 | 1 | 85 | 10 | 3 | 0 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 17:45 - 18:00 | 1 | 55 | 6 | 0 | 0 | 1 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 |
| 18:00 - 18:15 | 0 | 50 | 5 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 |
| 18:15 - 18:30 | 0 | 56 | 4 | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 |
| HOURLY TOTAL | 2 | 246 | 25 | 3 | 0 | 2 | 278 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 278 |
| PERIOD TOTAL | 2 | 556 | 53 | 8 | 0 | 4 | 623 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 623 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: QUEENS ROAD / A41 SLIPS (NORTHSIDE)

ARM: QUEENS ROAD (NORTH)

| TIME / CLASS | LEFT TO A41 (EAST) | | | | | | | STRAIGHT TO QUEENS ROAD (SOUTH) | | | | | | | RIGHT TO A41 (WEST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 26 | 7 | 1 | 0 | 0 | 34 | 1 | 49 | 2 | 1 | 2 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 |
| 7:15 - 7:30 | 0 | 27 | 4 | 0 | 0 | 0 | 31 | 0 | 62 | 16 | 1 | 0 | 0 | 79 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 110 |
| 7:30 - 7:45 | 0 | 33 | 3 | 0 | 0 | 0 | 36 | 1 | 76 | 8 | 1 | 0 | 1 | 87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 123 |
| 7:45 - 8:00 | 0 | 34 | 2 | 1 | 0 | 0 | 37 | 1 | 67 | 12 | 0 | 1 | 1 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119 |
| HOURLY TOTAL | 0 | 120 | 16 | 2 | 0 | 0 | 138 | 3 | 254 | 38 | 3 | 3 | 2 | 303 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 441 |
| 8:00 - 8:15 | 0 | 29 | 2 | 0 | 0 | 0 | 31 | 0 | 75 | 11 | 0 | 3 | 0 | 89 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 120 |
| 8:15 - 8:30 | 0 | 39 | 1 | 0 | 0 | 0 | 40 | 0 | 43 | 4 | 1 | 0 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 |
| 8:30 - 8:45 | 0 | 30 | 1 | 0 | 1 | 0 | 32 | 0 | 48 | 2 | 0 | 2 | 0 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 84 |
| 8:45 - 9:00 | 0 | 26 | 2 | 0 | 0 | 0 | 28 | 0 | 40 | 1 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 69 |
| HOURLY TOTAL | 0 | 124 | 6 | 0 | 1 | 0 | 131 | 0 | 206 | 18 | 1 | 5 | 0 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 361 |
| PERIOD TOTAL | 0 | 244 | 22 | 2 | 1 | 0 | 269 | 3 | 460 | 56 | 4 | 8 | 2 | 533 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 802 |
| 16:30 - 16:45 | 0 | 12 | 4 | 0 | 0 | 0 | 16 | 0 | 34 | 13 | 0 | 3 | 1 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67 |
| 16:45 - 17:00 | 0 | 24 | 4 | 0 | 0 | 0 | 28 | 0 | 44 | 7 | 3 | 4 | 1 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 87 |
| 17:00 - 17:15 | 0 | 30 | 2 | 0 | 0 | 0 | 32 | 1 | 38 | 4 | 4 | 2 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 |
| 17:15 - 17:30 | 0 | 23 | 3 | 0 | 0 | 0 | 26 | 1 | 59 | 11 | 3 | 3 | 0 | 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 103 |
| HOURLY TOTAL | 0 | 89 | 13 | 0 | 0 | 0 | 102 | 2 | 175 | 35 | 10 | 12 | 2 | 236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 338 |
| 17:30 - 17:45 | 0 | 20 | 3 | 0 | 0 | 0 | 23 | 0 | 47 | 7 | 0 | 5 | 4 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86 |
| 17:45 - 18:00 | 0 | 17 | 2 | 0 | 0 | 0 | 19 | 0 | 51 | 5 | 0 | 2 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77 |
| 18:00 - 18:15 | 0 | 12 | 1 | 0 | 0 | 0 | 13 | 0 | 38 | 16 | 3 | 2 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 |
| 18:15 - 18:30 | 0 | 15 | 2 | 0 | 0 | 1 | 18 | 0 | 34 | 9 | 1 | 2 | 1 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 65 |
| HOURLY TOTAL | 0 | 64 | 8 | 0 | 0 | 1 | 73 | 0 | 170 | 37 | 4 | 11 | 5 | 227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 |
| PERIOD TOTAL | 0 | 153 | 21 | 0 | 0 | 1 | 175 | 2 | 345 | 72 | 14 | 23 | 7 | 463 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 638 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: QUEENS ROAD / A41 SLIPS (NORTHSIDE)

ARM: A41 (EAST)

| TIME / CLASS | LEFT TO QUEENS ROAD (SOUTH) | | | | | | | STRAIGHT TO A41 (WEST) | | | | | | | RIGHT TO QUEENS ROAD (NORTH) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 1 | 7 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 7:15 - 7:30 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 7:30 - 7:45 | 0 | 5 | 1 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 7:45 - 8:00 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| HOURLY TOTAL | 0 | 15 | 9 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 |
| 8:00 - 8:15 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 8:15 - 8:30 | 0 | 7 | 3 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 8:30 - 8:45 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 8:45 - 9:00 | 0 | 6 | 2 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| HOURLY TOTAL | 0 | 20 | 6 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 |
| PERIOD TOTAL | 0 | 35 | 15 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 |
| 16:30 - 16:45 | 0 | 4 | 1 | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 16:45 - 17:00 | 0 | 7 | 2 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 17:00 - 17:15 | 0 | 7 | 2 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 10 |
| 17:15 - 17:30 | 0 | 6 | 1 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| HOURLY TOTAL | 0 | 24 | 6 | 1 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 32 |
| 17:30 - 17:45 | 0 | 8 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 9 |
| 17:45 - 18:00 | 0 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 18:00 - 18:15 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 18:15 - 18:30 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| HOURLY TOTAL | 0 | 23 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 24 |
| PERIOD TOTAL | 0 | 47 | 6 | 1 | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 56 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: QUEENS ROAD / A41 SLIPS (NORTHSIDE)

ARM: QUEENS ROAD (SOUTH)

| TIME / CLASS | LEFT TO A41 (WEST) | | | | | | | STRAIGHT TO QUEENS ROAD (NORTH) | | | | | | | RIGHT TO A41 (EAST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 11 | 2 | 1 | 0 | 77 | 0 | 31 | 5 | 1 | 0 | 0 | 37 | 114 |
| 7:15 - 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 68 | 17 | 0 | 0 | 0 | 86 | 0 | 44 | 7 | 0 | 0 | 0 | 51 | 137 |
| 7:30 - 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 34 | 6 | 4 | 0 | 1 | 46 | 0 | 48 | 6 | 0 | 0 | 0 | 54 | 100 |
| 7:45 - 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 59 | 7 | 1 | 2 | 1 | 70 | 0 | 50 | 4 | 1 | 0 | 0 | 55 | 125 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 224 | 41 | 7 | 3 | 2 | 279 | 0 | 173 | 22 | 2 | 0 | 0 | 197 | 476 |
| 8:00 - 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 13 | 2 | 1 | 0 | 88 | 0 | 48 | 2 | 1 | 0 | 1 | 52 | 140 |
| 8:15 - 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 8 | 5 | 0 | 0 | 58 | 0 | 46 | 5 | 0 | 0 | 0 | 51 | 109 |
| 8:30 - 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 7 | 4 | 1 | 0 | 46 | 0 | 21 | 5 | 0 | 0 | 0 | 26 | 72 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 34 | 11 | 5 | 1 | 0 | 52 | 0 | 29 | 4 | 0 | 0 | 0 | 33 | 85 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 185 | 39 | 16 | 3 | 0 | 244 | 0 | 144 | 16 | 1 | 0 | 1 | 162 | 406 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 409 | 80 | 23 | 6 | 2 | 523 | 0 | 317 | 38 | 3 | 0 | 1 | 359 | 882 |
| 16:30 - 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 71 | 12 | 1 | 0 | 0 | 84 | 0 | 21 | 4 | 0 | 0 | 0 | 25 | 109 |
| 16:45 - 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 91 | 23 | 2 | 0 | 0 | 116 | 0 | 20 | 3 | 0 | 0 | 0 | 23 | 139 |
| 17:00 - 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 16 | 0 | 1 | 1 | 84 | 0 | 25 | 3 | 1 | 0 | 0 | 29 | 113 |
| 17:15 - 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 82 | 10 | 1 | 0 | 1 | 95 | 0 | 24 | 2 | 0 | 0 | 0 | 26 | 121 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 310 | 61 | 4 | 1 | 2 | 379 | 0 | 90 | 12 | 1 | 0 | 0 | 103 | 482 |
| 17:30 - 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 66 | 8 | 0 | 1 | 0 | 77 | 0 | 19 | 1 | 0 | 0 | 0 | 20 | 97 |
| 17:45 - 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 8 | 0 | 1 | 1 | 61 | 0 | 21 | 2 | 0 | 0 | 0 | 23 | 84 |
| 18:00 - 18:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 74 | 4 | 2 | 0 | 0 | 81 | 0 | 23 | 4 | 1 | 1 | 0 | 29 | 110 |
| 18:15 - 18:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 2 | 1 | 0 | 1 | 51 | 0 | 19 | 2 | 0 | 0 | 0 | 21 | 72 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 238 | 22 | 3 | 2 | 2 | 270 | 0 | 82 | 9 | 1 | 1 | 0 | 93 | 363 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 548 | 83 | 7 | 3 | 4 | 649 | 0 | 172 | 21 | 2 | 1 | 0 | 196 | 845 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: QUEENS ROAD / A41 SLIPS (NORTHSIDE)

ARM: A41 (WEST)

| TIME / CLASS | LEFT TO QUEENS ROAD (NORTH) | | | | | | | STRAIGHT TO A41 (EAST) | | | | | | | RIGHT TO QUEENS ROAD (SOUTH) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 3 |
| 7:15 - 7:30 | 0 | 4 | 0 | 1 | 0 | 0 | 5 | 0 | 1 | 2 | 0 | 0 | 0 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 12 |
| 7:30 - 7:45 | 0 | 4 | 0 | 0 | 1 | 0 | 5 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 3 | 3 | 0 | 1 | 0 | 7 | 15 |
| 7:45 - 8:00 | 0 | 2 | 0 | 1 | 1 | 0 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 1 | 0 | 0 | 7 | 12 |
| HOURLY TOTAL | 0 | 11 | 0 | 2 | 2 | 0 | 15 | 0 | 4 | 3 | 0 | 0 | 0 | 7 | 0 | 15 | 3 | 1 | 1 | 0 | 20 | 42 |
| 8:00 - 8:15 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 10 | 2 | 0 | 0 | 0 | 12 | 14 |
| 8:15 - 8:30 | 0 | 4 | 0 | 2 | 0 | 0 | 6 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 0 | 1 | 0 | 5 | 13 |
| 8:30 - 8:45 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 2 | 0 | 0 | 0 | 5 | 8 |
| 8:45 - 9:00 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 1 | 0 | 4 | 6 |
| HOURLY TOTAL | 0 | 5 | 0 | 4 | 0 | 0 | 9 | 0 | 4 | 2 | 0 | 0 | 0 | 6 | 0 | 18 | 6 | 0 | 2 | 0 | 26 | 41 |
| PERIOD TOTAL | 0 | 16 | 0 | 6 | 2 | 0 | 24 | 0 | 8 | 5 | 0 | 0 | 0 | 13 | 0 | 33 | 9 | 1 | 3 | 0 | 46 | 83 |
| 16:30 - 16:45 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 4 | 1 | 1 | 0 | 0 | 6 | 11 |
| 16:45 - 17:00 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 4 | 0 | 0 | 0 | 7 | 11 |
| 17:00 - 17:15 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 9 | 3 | 0 | 1 | 0 | 13 | 20 |
| 17:15 - 17:30 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 7 | 2 | 1 | 0 | 0 | 10 | 14 |
| HOURLY TOTAL | 0 | 7 | 2 | 1 | 0 | 0 | 10 | 0 | 8 | 2 | 0 | 0 | 0 | 10 | 0 | 23 | 10 | 2 | 1 | 0 | 36 | 56 |
| 17:30 - 17:45 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 13 | 7 | 1 | 0 | 0 | 21 | 25 |
| 17:45 - 18:00 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12 | 1 | 0 | 0 | 0 | 13 | 17 |
| 18:00 - 18:15 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14 | 0 | 0 | 1 | 0 | 15 | 17 |
| 18:15 - 18:30 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 8 | 1 | 0 | 1 | 0 | 10 | 13 |
| HOURLY TOTAL | 0 | 7 | 0 | 0 | 0 | 0 | 7 | 0 | 5 | 1 | 0 | 0 | 0 | 6 | 0 | 47 | 9 | 1 | 2 | 0 | 59 | 72 |
| PERIOD TOTAL | 0 | 14 | 2 | 1 | 0 | 0 | 17 | 0 | 13 | 3 | 0 | 0 | 0 | 16 | 0 | 70 | 19 | 3 | 3 | 0 | 95 | 128 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: DEOPHAM ROAD / A41 SLIPS

ARM: A41 (WEST)

| TIME / CLASS | LEFT TO DEOPHAM ROAD | | | | | | | STRAIGHT TO A41 (EAST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 57 | 9 | 2 | 0 | 0 | 68 | 71 |
| 7:15 - 7:30 | 0 | 3 | 4 | 0 | 0 | 0 | 7 | 0 | 69 | 9 | 0 | 0 | 0 | 78 | 85 |
| 7:30 - 7:45 | 0 | 4 | 3 | 0 | 0 | 0 | 7 | 0 | 79 | 7 | 0 | 0 | 0 | 86 | 93 |
| 7:45 - 8:00 | 0 | 7 | 2 | 0 | 0 | 0 | 9 | 0 | 78 | 4 | 2 | 0 | 0 | 84 | 93 |
| HOURLY TOTAL | 0 | 14 | 12 | 0 | 0 | 0 | 26 | 0 | 283 | 29 | 4 | 0 | 0 | 316 | 342 |
| 8:00 - 8:15 | 0 | 15 | 2 | 0 | 0 | 0 | 17 | 0 | 62 | 3 | 1 | 0 | 1 | 67 | 84 |
| 8:15 - 8:30 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 83 | 6 | 0 | 0 | 0 | 89 | 93 |
| 8:30 - 8:45 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 0 | 49 | 5 | 0 | 1 | 0 | 55 | 60 |
| 8:45 - 9:00 | 0 | 7 | 1 | 0 | 0 | 0 | 8 | 0 | 49 | 5 | 0 | 0 | 0 | 54 | 62 |
| HOURLY TOTAL | 0 | 29 | 5 | 0 | 0 | 0 | 34 | 0 | 243 | 19 | 1 | 1 | 1 | 265 | 299 |
| PERIOD TOTAL | 0 | 43 | 17 | 0 | 0 | 0 | 60 | 0 | 526 | 48 | 5 | 1 | 1 | 581 | 641 |
| 16:30 - 16:45 | 0 | 7 | 1 | 0 | 0 | 0 | 8 | 0 | 27 | 8 | 0 | 0 | 0 | 35 | 43 |
| 16:45 - 17:00 | 0 | 6 | 1 | 0 | 0 | 0 | 7 | 0 | 40 | 6 | 0 | 0 | 0 | 46 | 53 |
| 17:00 - 17:15 | 0 | 9 | 1 | 0 | 0 | 0 | 10 | 0 | 50 | 4 | 1 | 0 | 0 | 55 | 65 |
| 17:15 - 17:30 | 0 | 9 | 1 | 0 | 0 | 0 | 10 | 0 | 39 | 5 | 0 | 0 | 0 | 44 | 54 |
| HOURLY TOTAL | 0 | 31 | 4 | 0 | 0 | 0 | 35 | 0 | 156 | 23 | 1 | 0 | 0 | 180 | 215 |
| 17:30 - 17:45 | 0 | 7 | 1 | 0 | 0 | 0 | 8 | 0 | 34 | 4 | 0 | 0 | 0 | 38 | 46 |
| 17:45 - 18:00 | 0 | 9 | 1 | 0 | 0 | 0 | 10 | 0 | 30 | 3 | 0 | 0 | 0 | 33 | 43 |
| 18:00 - 18:15 | 0 | 10 | 0 | 0 | 0 | 0 | 10 | 0 | 26 | 5 | 1 | 1 | 0 | 33 | 43 |
| 18:15 - 18:30 | 0 | 7 | 0 | 0 | 0 | 0 | 7 | 0 | 28 | 4 | 0 | 0 | 1 | 33 | 40 |
| HOURLY TOTAL | 0 | 33 | 2 | 0 | 0 | 0 | 35 | 0 | 118 | 16 | 1 | 1 | 1 | 137 | 172 |
| PERIOD TOTAL | 0 | 64 | 6 | 0 | 0 | 0 | 70 | 0 | 274 | 39 | 2 | 1 | 1 | 317 | 387 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: DEOPHAM ROAD / A41 SLIPS

ARM: DEOPHAM ROAD

| TIME / CLASS | LEFT TO A41 (EAST) | | | | | | | RIGHT TO A41 (WEST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 8 | 8 |
| 7:15 - 7:30 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 8 |
| 7:30 - 7:45 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 0 | 0 | 0 | 6 | 7 |
| 7:45 - 8:00 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 6 |
| HOURLY TOTAL | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 0 | 15 | 9 | 0 | 0 | 0 | 24 | 29 |
| 8:00 - 8:15 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 5 |
| 8:15 - 8:30 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 7 | 3 | 0 | 0 | 0 | 10 | 11 |
| 8:30 - 8:45 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 1 | 0 | 0 | 0 | 5 | 6 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 0 | 0 | 0 | 8 | 8 |
| HOURLY TOTAL | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 20 | 6 | 0 | 0 | 0 | 26 | 30 |
| PERIOD TOTAL | 0 | 7 | 2 | 0 | 0 | 0 | 9 | 0 | 35 | 15 | 0 | 0 | 0 | 50 | 59 |
| 16:30 - 16:45 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 1 | 1 | 0 | 0 | 6 | 7 |
| 16:45 - 17:00 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 7 | 2 | 0 | 0 | 0 | 9 | 12 |
| 17:00 - 17:15 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 7 | 3 | 0 | 0 | 0 | 10 | 12 |
| 17:15 - 17:30 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 1 | 0 | 0 | 0 | 7 | 9 |
| HOURLY TOTAL | 0 | 8 | 0 | 0 | 0 | 0 | 8 | 0 | 24 | 7 | 1 | 0 | 0 | 32 | 40 |
| 17:30 - 17:45 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 8 | 1 | 0 | 0 | 0 | 9 | 11 |
| 17:45 - 18:00 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 0 | 0 | 0 | 0 | 6 | 8 |
| 18:00 - 18:15 | 0 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 11 |
| 18:15 - 18:30 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 7 |
| HOURLY TOTAL | 0 | 13 | 0 | 0 | 0 | 0 | 13 | 0 | 23 | 1 | 0 | 0 | 0 | 24 | 37 |
| PERIOD TOTAL | 0 | 21 | 0 | 0 | 0 | 0 | 21 | 0 | 47 | 8 | 1 | 0 | 0 | 56 | 77 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: DEOPHAM ROAD / A41 SLIPS

ARM: A41 (EAST)

| TIME / CLASS | STRAIGHT TO A41 (WEST) | | | | | | | RIGHT TO DEOPHAM ROAD | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:15 - 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 - 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 - 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:00 - 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:15 - 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:30 - 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:30 - 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:45 - 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00 - 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:15 - 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 - 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:45 - 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18:00 - 18:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18:15 - 18:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Manual Classified Turning Counts, Attleborough

DATE: WEDNESDAY 10th OCTOBER 2007

LOCATION: QUEENS ROAD / A41 SLIPS (SOUTHERN SIDE)

ARM: QUEENS ROAD (NORTH)

| TIME / CLASS | LEFT TO A41 (EAST) | | | | | | | STRAIGHT TO QUEENS ROAD (SOUTH) | | | | | | | RIGHT TO A41 (WEST) | | | | | | | TOTAL MOVEMENT FROM ARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | MOTOR CYCLE | CAR TAXI | LGV | OGV1 | OGV2 | BUS COACH | TOTAL | |
| 7:00 - 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 39 | 8 | 1 | 1 | 0 | 50 | 0 | 13 | 1 | 0 | 1 | 0 | 15 | 65 |
| 7:15 - 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 10 | 1 | 0 | 0 | 74 | 0 | 7 | 7 | 0 | 0 | 0 | 14 | 88 |
| 7:30 - 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 64 | 11 | 1 | 1 | 1 | 79 | 0 | 20 | 1 | 0 | 0 | 0 | 21 | 100 |
| 7:45 - 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 61 | 11 | 1 | 1 | 1 | 76 | 0 | 17 | 1 | 0 | 0 | 0 | 18 | 94 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 227 | 40 | 4 | 3 | 2 | 279 | 0 | 57 | 10 | 0 | 1 | 0 | 68 | 347 |
| 8:00 - 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 69 | 13 | 0 | 1 | 0 | 83 | 0 | 19 | 0 | 0 | 2 | 0 | 21 | 104 |
| 8:15 - 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 8 | 0 | 0 | 0 | 47 | 0 | 13 | 1 | 1 | 1 | 0 | 16 | 63 |
| 8:30 - 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 3 | 0 | 1 | 0 | 45 | 0 | 14 | 2 | 0 | 1 | 0 | 17 | 62 |
| 8:45 - 9:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 2 | 0 | 1 | 0 | 31 | 0 | 21 | 1 | 0 | 0 | 0 | 22 | 53 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 26 | 0 | 3 | 0 | 206 | 0 | 67 | 4 | 1 | 4 | 0 | 76 | 282 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 404 | 66 | 4 | 6 | 2 | 485 | 0 | 124 | 14 | 1 | 5 | 0 | 144 | 629 |
| 16:30 - 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 12 | 2 | 1 | 1 | 51 | 0 | 7 | 3 | 0 | 2 | 0 | 12 | 63 |
| 16:45 - 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 10 | 2 | 0 | 1 | 59 | 0 | 8 | 3 | 1 | 4 | 0 | 16 | 75 |
| 17:00 - 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 44 | 6 | 4 | 2 | 0 | 57 | 0 | 10 | 3 | 0 | 1 | 0 | 14 | 71 |
| 17:15 - 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 67 | 13 | 3 | 1 | 0 | 85 | 0 | 5 | 1 | 1 | 2 | 0 | 9 | 94 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 192 | 41 | 11 | 4 | 2 | 252 | 0 | 30 | 10 | 2 | 9 | 0 | 51 | 303 |
| 17:30 - 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 56 | 11 | 1 | 2 | 4 | 74 | 0 | 12 | 3 | 0 | 3 | 0 | 18 | 92 |
| 17:45 - 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 5 | 0 | 1 | 0 | 56 | 0 | 19 | 1 | 0 | 1 | 0 | 21 | 77 |
| 18:00 - 18:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 14 | 3 | 1 | 0 | 62 | 0 | 13 | 2 | 0 | 2 | 0 | 17 | 79 |
| 18:15 - 18:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 6 | 1 | 1 | 1 | 47 | 0 | 8 | 4 | 0 | 2 | 0 | 14 | 61 |
| HOURLY TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 188 | 36 | 5 | 5 | 5 | 239 | 0 | 52 | 10 | 0 | 8 | 0 | 70 | 309 |
| PERIOD TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 380 | 77 | 16 | 9 | 7 | 491 | 0 | 82 | 20 | 2 | 17 | 0 | 121 | 612 |